SUPPLEMENT No. 1

TO

STATE OF NEVADA
DEPARTMENT OF HIGHWAYS

STANDARD SPECIFICATIONS

1946 Edition

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1946
Supplement 1

Effective Aug. 28, 1953

It is hereby directed that the "State of Nevada, Department of Highways, Standard Specifications," 1946 Edition be and they are hereby added to, revised and amended as particularly set forth and provided in "Supplement No. 1 to State of Nevada, Department of Highways Standard Specifications," 1946 Edition attached hereto.

The amendments, revisions and additions contained in said Supplement No. 1 shall become effective on the 28th day of August, 1953.

H. D. MILLS
State Highway Engineer

By: A. G. Kinne

A. G. Kinne
Engineer of Design

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R. D. MILLS
State Highway Engineer

By: _____
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SUPPLEMENT NO. 1

TO THE

STANDARD SPECIFICATIONS

(Edition of 1946)

PART I

GENERAL REQUIREMENTS AND COVENANTS

SECTION 1 - DEFINITION OF TERMS

1.31 SPECIAL PROVISIONS. Change to Read:

Special directions, provisions, or requirements peculiar to the project under consideration and not otherwise thoroughly or satisfactorily detailed or set forth in the specifications. Special provisions shall prevail over specifications and supplemental specifications whenever in conflict therewith and over all plans. They set forth a final contractual intent as to the matter involved.

1.32 SPECIFICATIONS. Change to Read:

The general term comprising all the directions, provisions and requirements contained herein, together with such as may be added or adopted as supplemental specifications or special provisions, all of which are necessary for the proper performance of the contract.

Add the following new Article:

1.42 SUPPLEMENTAL SPECIFICATIONS. Specifications adopted subsequent to the publication of the Standard Specifications. They generally involve new construction items or substantial changes in the approved specifications. Supplemental specifications shall prevail over those published in the Standard Specifications whenever in conflict therewith.

SECTION 2 - PROPOSAL REQUIREMENTS AND CONDITION

2.4 PREPARATION OF PROPOSAL. Change to Read:

The bidder shall submit his proposal upon the blank forms furnished by the Department. The bidder shall specify a unit price in both words and figures for each and every item for which a quantity is given, and shall also show the products of the respective unit prices and quantities, written in figures in the column provided for that purpose, and the total amount of the proposal obtained by adding the amounts of the several items.

All words and figures shall be written in ink or typewritten. In case of a discrepancy between the prices written in words and those written in figures, the written words shall govern.

The bidder's proposal shall be signed with ink by the individual, by one or more members of the partnership, or by one or more of the officers of the corporation submitting it.

2.6 PROPOSAL GUARANTY. Change to Read:

No proposal shall be considered unless accompanied by an undertaking executed by a corporate surety company authorized to do business in the State of Nevada, in an amount equal to five percent (5%) of his bid, or in the alternative every bid shall be accompanied by cash, a cashier's check, or a certified check of the bidder in an amount equal to five percent (5%) of his bid, said check to be made payable to the State Highways Fund; said undertaking provided for herein, if used, to be conditioned to the effect that should the bidder to whom the contract is awarded fail to enter into the contract in accordance with the bid, and to give the bond required by the said contract within fifteen (15) days after notice of such award, said surety company shall forthwith pay into the State Highways Fund the sum set forth in the undertaking.

2.11 COMPETENCY OF BIDDERS. Change to Read:

All bidders shall be prequalified as required by law. To be qualified, a prospective bidder shall submit under oath, on the standard form furnished by the Department, a statement of his financial ability and experience in performing public work. Financial statements shall be prepared and certified by a certified public accountant, or by an accountant who has been previously approved by the Department as being competent to prepare a contractor's financial statement. After verifying the information contained in the statement, the Department shall notify the submitter of the maximum contract amount and class of work upon which he will be eligible to bid.

Statements of financial ability and experience shall be submitted as of the date upon which the fiscal year of the prospective bidder ends. In order to remain on the qualified list a prospective bidder shall submit a new statement at the close of his fiscal year. A prospective bidder not already qualified shall submit his statement of financial ability and experience at least five (5) full days prior to the date set for the opening of bids in which he is interested in order to have it considered, but qualification shall not be granted until such statement has been verified. Statements shall preferably be submitted at least thirty (30) days prior to bid opening.

No bid will be accepted from, or a contract awarded to, a contractor who is not licensed in accordance with the law under the provisions of Chapter 186, Statutes of 1941, as amended to date, and to whom a proposal form has not been issued by the Department of Highways.

Nothing contained in this section shall be construed as depriving the Department of its discretion in the matter of determining the lowest responsible bidder.

Add the following new Article:

2.14 Gasoline Tax Refund - Motor Fuel Tax Refund. It is understood and agreed that the price bid by the contractor for the work to be done under this contract shall include the State tax on all gasoline, distillate, diesel fuel, and other motor fuels used in the performance of the work, including that used in the operation of stationary gasoline engines, tractors, and power shovels, as well as that used in motor vehicles; and it is further agreed, that if any refund of said State tax is received by the contractor or his subcontractors, or employees, on gasoline, distillate, diesel fuel or other motor fuels used in the performance of the work incidental to this contract, the amount thereof shall be credited to the State on amounts due to the contractor under this contract or shall be paid to the State by the contractor in cash.

SECTION 4 - SCOPE OF WORK

Change entire specification to Read:

4.1 Intent of Contract. The intent of the contract is to prescribe a complete work or improvement which the contractor undertakes to do, in full compliance with the plans, specifications, special provisions, proposal, and contract They are to be cooperative and what is called for by either is as binding as if called for by both.

Plans represent the conditions as foreseen; however, the various quantities represented thereon may, if necessary, be increased or diminished during construction without impairing the contract.

The contractor shall perform all work in accordance with lines, grades, typical cross section and dimensions and other data shown on the plans or as modified by written orders, including the furnishing of all materials, implements, machinery, equipment, tools, supplies, transportation, labor, and for all other things necessary to the satisfactory prosecution and completion of the project.

4.2 Special Work. Should any construction or conditions which are not covered by the plans or these specifications be anticipated, "Special Provisions" for such work will be prepared by the engineer, stated on insert sheets attached to the proposal forms and such "Special Provisions" shall be considered a part of these specifications the same as though contained herein. Should any such "Special Provisions" or requirements conflict with these specifications or supplements thereto, the "Special Provisions" shall govern, if they apply to any such given piece of work.

4.3 Increased or Decreased Quantities of Work. The engineer reserves the right to make, by written order and without notice to surety, such alterations in the plans or character or quantity of the work which may be considered necessary or desirable from time to time during the progress of the work to complete satisfactorily the proposed construction. Such alterations shall not be considered as a waiver of any conditions of the contract or invalidate any of the provisions thereof.

The right is reserved to increase or decrease any or all of the items in the estimate of approximate quantities as shown in the proposal. The length of the project may be increased or decreased by adding or omitting sections or by relocation.

Whenever the termini of the project are changed and whenever any change or combination of changes results in increasing or decreasing the original contract amount as calculated from the bid quantities and contract unit prices by more than twenty-five

(25) percent, a supplemental agreement acceptable to both parties to the contract shall be executed in advance of performing the affected work.

Whenever an overrun or underrun of more than twenty-five (25) percent of the original bid quantity for one or more major contract items occur, except items of overhaul, structure excavation, backfill, piling, concrete, seal courses, water, rolling, and such other items as may be specifically excluded in the special provisions, either party to the contract may demand a supplemental agreement be negotiated with an adjustment of unit price or prices satisfactory to both parties. A major contract item shall be defined as any item whose total cost determined by multiplying the proposal quantity and contract unit price, is equal to or greater than five percent (5%) of the total original contract cost.

Whenever an alteration in character of work involves a substantial change in the nature of the design or in the type of construction which materially increases or decreases the cost of the performance, the work shall be performed in accordance with the specifications and as directed, provided however, that before such work is started a supplemental agreement acceptable to both parties to the contract shall be executed.

Whenever an overrun or underrun in any minor item not excluded above of more than one and one-quarter percent (1-1/4%) of the contract amount occurs either party to the contract may demand that a supplemental agreement be negotiated with an adjustment of unit price or prices satisfactory to both parties.

If it is found that the quantity of any major item required to complete the work underruns or overruns not more than twenty-five (25) percent of the proposal quantity, payment for the work performed will be made at the contract unit price for the quantity of work actually performed.

If it is found that any major item underruns more than twenty-five (25) percent of the original proposal quantity, the contractor may submit a request for revision of the contract unit price for such item and shall submit evidence to support his claim. Such claim will be considered insofar as it justifies an increase in the pro rata share of fixed expenses chargeable to such item because of the decreased quantity of the item, provided, however, no allowance shall be made for anticipated profits.

If it should be found that the quantity of any major item overruns more than twenty-five (25) percent of the original proposal quantity due to a substantial change in the nature of design or in the type of construction which materially increase unit costs to the contractor, the contractor may submit a request for a revision of contract unit price for such quantity of the item as is in excess of twenty-five (25) percent of the original proposal quantity. The revision of the unit price shall be negotiated on the basis of actual cost plus a reasonable allowance for profit and overhead. Written requests for a supplemental agreement shall set forth in detail the particulars and character by which the work was changed and by what amounts the unit price of the proposal item will be altered. Failure of the contractor to file a request for a supplemental agreement within ten (10) days after any of the above outlined conditions are encountered shall be considered a waiver thereof on part of the contractor and payment shall be made at the contract unit price for the actual quantity of work performed.

If a supplemental agreement satisfactory to both parties cannot be agreed upon, the engineer may order the work in dispute to be performed on a force account basis or he may cancel the work from the contract.

Changes not requiring negotiated agreements, except as to extra work involved, shall be ordered by means of a change order, and acceptance by the contractor, as evidenced by his signature, shall constitute agreement that the change does not involve any adjustment of contract unit prices. Should the nature of the change order be such that the adjustment of contract time for completion as provided in Article 8.6 for increased quantities of work is not equitable, the engineer shall determine the additional time to be allowed, and such time shall be stated on the order. Work shall not be started on any such change until the change order has been delivered to the contractor and accepted by him.

In case the contractor refuses to accept a change order because he considered the change to involve an adjustment of prices, or agreement cannot be reached in regard to price adjustment for a supplemental agreement, the engineer may order the work to proceed and defer settlement of the disputed points.

4.4 Extra Work. Extra work shall be performed by the contractor, upon receipt of a written order to perform such work, in accordance with the specifications and as directed. Such order shall be on the standard extra work order form, except that when a change is also involved it may be included in the change order. The order shall state the work to be done, the method of payment and the estimated total cost. The method of payment may be agreed unit prices, force account, or a combination of the two. Agreed unit prices together with the estimated quantities of each unit shall be shown. Orders involving force account work shall be detailed as required in Article 4.5.

Should the nature of the extra work be such that the adjustment of contract time for completion, as provided in Article 8.6 for increased quantities of work, is not equitable, the engineer shall determine the additional time to be allowed, and such time shall be stated on the order.

If it is found necessary during the progress of the work to exceed the total estimated cost by more than 15 percent, or to use equipment, materials, or items not listed in the order, a supplemental order shall be issued before such additional cost is incurred or such additional equipment or materials are used.

Acceptance of the order by the contractor, as evidenced by his signature, shall constitute his agreement to unit prices or rental rates indicated on the order as agreed prices or rates.

4.5 Force Account Work. When the proposal includes an item or items to be done by force account, or when a supplemental agreement or change order provides for doing certain work by force account, such work shall be performed upon receipt of a written order issued by the engineer. The order shall include the following details:

(a) Statement of work to be done.
(b) Estimated number of hours and estimated hourly wage for each class of labor.

(c) Estimate number of hours and rental rate for all equipment and teams.
(d) Amount and estimate cost of all materials.
(e) Estimate total cost.

The rental rates shall be the contract rates if any, otherwise they shall be agreed rates. In case rental rates cannot be agreed upon, the engineer may so indicate on the order and use for estimate purposes what he considers a fair price, deferring for future settlement the final rates to be used.

If it is found necessary during the progress of the work to exceed the total estimate cost by more than 15 percent, or to use equipment, materials, or items not listed in the order, a supplemental order shall be issued before such additional cost is incurred or such additional equipment or materials are used.

Acceptance of the order by the contractor, as evidenced by his signature, shall constitute his agreement to unit prices or rental rates indicated on the order as agreed prices or rates.

The plan of work to be followed, the equipment to be used, and the amount and class of labor to be employed shall be determined by the engineer.

4.6 Rights in and Use of Materials Found in the Work. The contractor, with the approval of the engineer, may use on the proposed construction suitable stone, gravel, or sand found in the excavation, and will be paid for the excavation of such materials at the corresponding contract unit price therefor, but he shall replace at his own expense with other acceptable material all that portion of the materials so removed and used as was contemplated for use in the embankments, backfills, approaches, or otherwise. No charge for materials so used shall be made against the contractor except the replacement herein provided for. The contractor shall not excavate or remove any material from within the highway right of way which is not within the excavation as indicated by the slope and grade lines, without written authorization from the engineer.

4.7 Final Cleaning Up. Before final acceptance, the contractor shall remove or obliterate, insofar as feasible, all objects or disturbances of the ground which mar the landscape and were caused by his operations, but which are not part of the improvement. This shall be required on all areas used or occupied by the contractor, regardless of right of way limits.

Rubbish, excess material, temporary structures, and discarded equipment shall be collected and burned, buried, or otherwise disposed of as directed by the engineer. Pits or trenches for equipment set-ups or camp sites shall be filled and the ground restored, insofar as feasible, to its original condition. Temporary haul roads shall be scarified and bladed to blend with surroundings. Pits from which materials have been obtained shall be dressed and shaped to conform with the surrounding ground. Waste shall be removed from the tops of banks and placed in the bottom of the pit. Except on steep sidehills, the banks of pits shall be cut to not steeper than one to one slope to blend with the natural contours. Bottoms of pits shall be reasonably smooth and level. All other disturbances shall be removed or corrected as directed by the engineer.

SECTION 6 - CONTROL OF MATERIALS

6.2 Local Materials. Change to Read:

Possible sources of local materials may be designated in the special provisions and the grading analyses of samples shown. The quality of material in such deposits will be acceptable in general, but the contractor shall determine for himself the amount of equipment and work required to secure a finished product meeting the specifications, and whether blending with other local materials will be necessary. It shall be understood that it is not feasible to ascertain from samples an average grading analysis for an entire deposit, and that wide variations from the grading shown shall be considered as usual and to be expected. It shall also be understood that the engineer may order procurement of material from any portion of any area designated as a pit site, and may reject portions of the deposit as unacceptable.

When material deposits are not designated in the special provisions, the contractor shall provide sources of material acceptable to the engineer.

The Department will endeavor to determine the ownership, royalty payment, and to acquire an option for the right to take materials from those sources designated on the plans or described under the Special Provisions. However, the contractor must negotiate and enter into a written agreement with the owners of material depsoits whether they are designated as described herein, or are deposits selected by the contractor. Prior to removing any material two executed copies of the agreement shall be furnished the engineer, one of which is to be forwarded to the Right of Way Engineer, Carson City, Nevada. Use of materials in the work shall not be permitted until the contractor has complied with the above requirements.

The contractor shall reimburse the named owner for all material taken from any source, the amounts thereof to be determined by the engineer, and the rate to be that specified in the executed agreements. If the contractor fails to make the required payments, deductions sufficient to cover the cost of the materials will be made from any moneys due him.

When designated deposits are located on government lands and have been withdrawn by the State as shown by the withdrawal application number on the Deposit Sketch, the agreements mentioned above will not be required. If the contractor selects a deposit on government lands other than that designated, he shall locate a placer claim in accordance with the mining laws of the State of Nevada.

When designated material deposits are shown on the plans or in the Special Provisions, the contractor shall not use material from another deposit until written approval of the change has been received from the engineer. It is understood that approval of a deposit other than designated will not increase the cost of the work. The engineer assumes no responsibility for the quantity of acceptable material in such deposits.

In case a designated deposit fails to contain the quantity of acceptable material indicated in the special provisions, the contractor shall immediately notify the engineer in writing. The engineer shall thereupon investigate, and if his investigation shows that there is not a sufficient quantity of acceptable material, he shall designate an alternate deposit from which to obtain the deficit. In such case, an adjustment of compensation shall be made as provided in Article 9.6.

Deposits which will impair the appearance of the roadside, more than if the material were taken from a designated deposit will not be approved. Generally, deposits located within five hundred (500) feet from the center line of the roadway, will not be approved.

SECTION 7 - LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

7.1 Laws to be Observed. Add the following:

The attention of the bidder is invited to the fact that this Department has been advised by the Wage and Hour Division, U.S. Department of Labor, that contractors engaged in highway construction work are required to meet the provisions of the Fair Labor Standards Act of 1938 (52 Stat. 1060).

7.9 Preservation and Restoration of Property and Landscape. Add the following:

Prior to constructing haul roads across publicly or privately owned lands, the contractor shall reach an agreement with the owners of the land or with the agency of the United States Government having jurisdiction over such lands relative to the location of the roads. He shall also reach an agreement with such agency having jurisdiction over public lands as to the location and eventual disposal of any wells he may drill in connection with this contract. In areas subject to the spread of halogeton he shall take all reasonable care during the course of construction of the project to avoid any unnecessary disturbance of soil or vegetation within the right of way, along haul roads or at pit sites from which material has been obtained.

7.10 Responsibility for Claims. Add the following:

Reimbursement to contractor by state in whole or in part for costs of protecting traffic shall not serve to relieve the contractor of his responsiblity as set forth in the Standard Specifications.

Add the following new Article.

7.15 Fire Prevention and Control. Before setting any fires whatsoever, the contractor shall notify the responsible Federal or State agency having jurisdiction for the area concerned. All burning shall be done at night unless otherwise authorized in writing by the engineer. The contractor shall abide by such rules and instructions as to fire prevention and control as the Forest Service, Bureau of Land Management, State Forester-Fire Warden or other Federal or State agency having jurisdiction may prescribe. The contractor shall take all necessary steps to prevent his employees from setting fires not required in the construction of the project, shall be responsible for preventing the escape of fires set in connection with construction of the project and shall under the direction of the appropriate Federal or State Agency, or, in the absence of an officer from any such agency, acting independently, extinguish all fires set or caused by his employees and all other fires which may so escape the project, whether or not set directly or indirectly as a result of construction operations, without expense to the State or Federal government. Where the contractor is obligated to suppress any fire without expense to the State or Federal government under the provisions of this article, if the amount and character of labor, subsistence, supplies and transportation which the contractor is in a position to furnish promptly for fire suppression prove inadequate for that purpose, in the judgment of the Federal or State agency in charge,

then the appropriate officer of such agency is authorized to procure and to charge to the contractor, such additional labor, subsistence, supplies and use of transportation facilities as he may deem necessary for the suppression of the fire. These expenses shall be billed to the contractor for payment directly by him, and if not promptly met by him shall be paid by the Federal or State government and deducted from the moneys due or which may become due the contractor under this contract, or collected from his sureties until the entire amount due the Federal or State government for said fire suppression is recovered.

The contractor shall maintain a fire patrol in the vicinity of blasting and other operations creating a fire hazard. When, in the opinion of the Federal or State agency having jurisdiction, such a patrol is unnecessary because of weather conditions, contractor shall be so notified through the engineer.

SECTION 8 - PROSECUTION AND PROGRESS

8.1 Subletting or Assigning the Contract. Change 1st & 2nd paragraphs to read as follows:

The contractor shall perform with his own organization and with the assistance of workmen under his immediate superintendence, work of a value not less than fifty (50) percent of the value of all work embraced in the contract exclusive of items not commonly found in contracts for similar work, or which require highly specialized knowledge, craftsmanship, and equipment not ordinary available in the organizations of contractors performing work of the character embraced in the contract.

If the bidder shall state in his proposal the particular item or items of work which he proposes to sublet and shall name therein the subcontractor to whom he proposes to sublet such work in the event of an award to him, such item or items of work may be performed by such subcontractor notwithstanding the fifty (50) percent limitation above mentioned, provided that the subcontractor named in the proposal is a contractor of recognized standing, has a record of satisfactory performance, and the work proposed to be sublet does not constitute the major item or items of work embraced in the contract.

SECTION 9 - MEASUREMENT AND PAYMENT

9.1 Measurement of Quantities. Add the following:

When a complete structure or structural unit (in effect, "lump sum" work) is specified as the unit of measurement, the unit will be construed to include all necessary fittings and accessories.

9.5 Force Account Work. Add the following:

By agreement with the Nevada Branch of the Associated General Contractors of America, fair rental rates for certain types of equipment have been determined. A list of these rates are appended to the Special Provisions. For equipment used on Force Account Work, and for which there is no contract price, the contractor shall accept rates not to exceed those set forth.

9.9 Acceptance and Final Payment. Add the following:

Final acceptance of the contract shall not be made unless all reports required in Article VI of Contract Provisions appended as part of the Special Provisions are completed in acceptable form and filed with the engineer.

PART II

CONSTRUCTION DETAILS

SECTION 10 - ACCOMMODATIONS FOR PUBLIC TRAFFIC

Change entire specification to read:

10.1 Description. This item shall consist of providing accommodations for public traffic by detouring traffic over existing roads, by permitting traffic to pass through construction operations, by constructing and maintaining special detours, or by a combination of these methods as indicated on the plans or in the special provisions or as directed in writing by the engineer.

10.2 Materials. The materials used for the construction and maintenance of facilities required for the free flow of public traffic and for protection of the work shall be those prescribed for the several items which constitute the finished work and shall conform to all the requirements for such materials as set out in Part III "Materials Details" or as otherwise specified.

10.3 General Requirements. Methods of handling traffic, if required, will be shown on the plans or in the special provisions.

No road or section thereof shall be closed to traffic unless provided on the plans, in the special provisions, or permitted by the engineer.

The contractor shall conduct his operations and the use of his equipment in such a manner that two-way traffic will continuously be provided throughout the entire length of the project, including special detours where required.

When conditions are such as to warrant variations from the requirement that two-way traffic be maintained, the exact procedure to be followed shall be approved by the engineer before traffic conditions are changed.

Access shall be permitted to residences, buildings, and driveways adjacent to existing roads, the road under construction, or special detours at all times and the contractor shall provide such temporary approach roads as may be required for this purpose.

When it is necessary for residents living along the project to use a portion of the road under construction, the Contractor shall maintain, within the limits of these specifications, that portion of the road in a suitable condition for such vehicular traffic.

During non-working hours the limits of any hazardous section shall be outlined with markers and flares placed not more than one hundred (100) feet apart. If deemed necessary by the engineer, barricades shall be erected to protect public traffic from such hazardous areas or he may direct the contractor to furnish flagging and piloting, if in his opinion conditions so warrant. Such flagging and piloting shall be done at the contractor's expense, provided, however, that flagging and piloting by the contractor after regular working hours will not be required if the contractor each day will leave the work in such a condition that it can be traveled over without damage to the work and without danger to the traffic. The engineer shall be the judge as to whether or not these conditions are satisfactorily complied with,

and as to whether or not flagging and piloting can be dispensed with after working hours.

When the contractor's hauling equipment is required to merge with or cross traffic, and at such other points as may be necessary to maintain safe traffic condition, flagmen shall be provided on each side of the impairment to stop and direct traffic.

All flagmen furnished for the protection of the public and direction of traffic shall perform their duties in a courteous manner with a view to insuring the safety and conveniences of the traveling public within the limits of the guarded area. The contractor shall immediately correct any deficiency in equipment or flagging procedure brought to his attention by the engineer.

Each flagman shall be supplied, for use in daylight, with a red shirt or jacket, red cap and a red flag not less than 18 inches by 18 inches square, mounted on a staff. To stop traffic in daylight, the flagman shall stand at the edge of the traffic lane, facing approaching traffic, with his arm and hand extended into the traffic lane, holding the red flag across the traffic lane. The red flag shall be held without waving so that the full area of the flag is below the staff and visible to the approaching traffic. In daylight, traffic shall be signaled to proceed by lowering the red flag and waving the arm (not the flag) in a forward direction.

Between the hours of sunset and sunrise the flagman shall be supplied with a white shirt or jacket and cap, and shall be equipped with lighted red lanterns or red light torches, and for emergencies, red light fusees. To stop or slow down traffic the red lantern or torch shall be waved back and forth across the field of vision of the drivers of approaching traffic. To signal traffic to proceed, a hand signal or verbal order shall be given.

Whenever it is necessary to divert the flow of traffic from its normal channel into another channel, the channel for such diverted traffic shall be clearly delineated by temporary markers or small temporary barricades. On tangents the temporary markers or small temporary barricades shall be placed not farther apart than two hundred (200) feet. On curves, the spacing of the temporary markers shall not be greater than the following:

> Six thousand (6000) foot radius to two thousand (2000) foot radius, two hundred (200) feet; under two thousand (2000) foot radius to nine hundred fifty (950) foot radius, one hundred (100) feet; under nine hundred fifty (950) foot radius to four hundred (400) foot radius, forty (40) feet; under four hundred (400) foot radius, twenty (20) feet.

In case of damage to detours due to storms or other causes, the contractor shall at once repair the damage or provide for carrying traffic through construction operations.

None of the provisions herein shall be construed to restrict or prohibit, at any time, the prosecution of items of work which will not interfere with the use of the existing highway.

10.4 Carrying Traffic Through Construction Operations. Where public traffic is carried through construction, it will be necessary to permit traffic to use a portion of the roadway during progress of the work. Roadway excavation and embankment constructions shall be conducted in such a manner as to provide a reasonably smooth and even surface satisfactory for use of public traffic at all times. If ordered by the engineer, roadway cuts shall be excavated in lifts and embankments constructed part width at a time, construction being alternated from one side to the other side and traffic routed over the side opposite the one under construction. Culverts shall be installed and backfilled one-half width at a time, or at each structure the contractor may construct and maintain, at his own expense, short run-around detours acceptable to the engineer.

Every attempt shall be made to provide adequate width for two (2) lanes of traffic; these traffic lanes shall be kept smooth, free from ruts, holes, rocks, ridges and bumps, by use of equipment, labor, and materials as may be necessary to accomplish this purpose. If, in the opinion of the engineer, the usable roadway is not sufficient to safely accommodate two-way traffic, the contractor shall adequately maintain one-way traffic. Whenever one-way traffic is in effect, the distance shall not be in excess of six thousand (6,000) feet.

Where controlled traffic is necessary for protection of the work or for safety of public traffic, it shall be handled in the following manner:

1. Flagmen will be required and used at all hazardous areas during grading operations.

2. If, in the opinion of the engineer, it is necessary to afford additional protection to the work, workmen or public traffic through construction operations, a pilot car and driver shall be used as he so directs.

3. Flagmen and pilot car and driver will be re-required as directed by the engineer, when it is indicated on the plans, or provided in these specifications or the special provisions during paving operations and surface treatment.

Pilot cars shall be suitable vehicles in good mechanical condition and shall carry a sign which shall comply with the design and mounting as shown in the standard drawing appended to the special provisions.

Water shall be applied at points and in amounts as directed by the engineer to keep the roadbed firm, smooth, and stable, and reduce the dust hazard to a minimum.

Whenever blasting is necessary, which will interfere with, endanger, or delay traffic, the operations shall be so conducted that traffic will not be delayed for periods longer than twenty (20) minutes. Such blasting shall be done only during hours when the volume of traffic is at a minimum.

The contractor shall maintain all structures or portions of structures in a condition for safe and convenient use. The contractor shall also maintain adequate guard rails, temporary markers, lights, signs, and such other traffic control devices, and flagmen as may be necessary to maintain safe traffic conditions.

The contractor shall maintain the subgrade, unprimed or primed base courses over which traffic is directed. This maintenance shall constitute continuous and effective work prosecuted day by day with adequate equipment and forces to the end that the subgrade or base is kept free from ruts, ridges, holes, and in satisfactory condition at all times.

10.5 Passing Traffic Over Existing Roads. Where traffic is diverted over existing roads, approach roads from the new grade to the old road shall be provided to properly accommodate traffic. Such approach raods shall be constructed to a width comparable to the existing road and shall be constructed in a manner satisfactory to the engineer before beginning work on the corresponding section of the new highway.

The existing road shall be widened and realigned as may be necessary to avoid conflict with the proposed new construction.

When windrowed material is left on the roadbed at night, such windrows shall be moved as far to one side of the roabed as feasible, and the windrows shall be outlined with flares and reflectorized guide markers placed not more than one hundred (100) feet apart. The windrow shall be flattened at points where traffic has to cross.

10.6 Special Detours. Special detours shall be constructed as shown on the plans or as specified in the special provisions. Detour locations indicated on the plans are approximate only; the exact location shall be as staked by the engineer.

Grading for special detours shall consist largely of blade grader work, supplemented where necessary by other mechanical equipment, to provide the specified roadbed width and a grade line free from breaks or rolls of sufficient magnitude to be hazardous to traffic.

When grading of special detours has been completed and approved by the engineer and, if required on the plans or in the special provisions, the special detours shall receive surfacing materials of the kind and type specified, and they shall be placed and constructed in accordance with the requirements for the particular materials used.

Water shall be applied to detours in amounts and at points as directed by the engineer to assist in the compaction of graded sections and of surfacing materials.

Maintenance on special detours shall consist largely of filling holes as they develop, adding surfacing, and applying liquid asphalt, blading, watering, and performing any other work necessary to maintain the detour satisfactorily, all as ordered by the engineer.

Upon disturbing the existing roadbed corresponding to a special detour, grading operations shall be prosecuted continuously to completion. Placing of gravel base or surface courses shall immediately follow completion of grading operations; and, in the case of gravel base course, bituminous prime coat shall be applied as soon thereafter as sections of sufficient length are available to permit the application of bituminous material in carload lots. The contractor shall permit traffic to travel over the primed or umprimed base course until such time as the remaining surfacing materials are being placed, at which time, traffic shall again be diverted

over the special detours. Maintenance of unprimed or primed base shall be as set forth in Article 10.4. If traffic is diverted over the unprimed base, water shall be applied at such points and in such amounts as to keep the roadbed firm, smooth, and stable, and reduce the dust hazard to a minimum.

After traffic has been turned over the completed new roadbed, temporary detour approach roads and those portions of special detours which are visible and unsightly from the new highway shall be removed and obliterated as directed by the engineer.

10.7 Barricades and Warning Signs. The contractor shall provide, erect, and maintain all necessary barricades, suitable and sufficient flares or red lights, danger signals and standard warning signs at locations shown on the plans, as set forth in the special provisions, or as directed by the engineer, for the protection of the work, workmen, and guidance and safety of the traveling public. Highways closed to traffic shall be protected by effective barricades on which shall be placed acceptable warning signs. The contractor shall provide and maintain acceptable warning and detour signs at all closures, intersections, and along the detour routes, directing the traffic around the closed portions of the highway so that the temporary detour route or routes shall be indicated clearly throughout its or their entire length. All barricades, signs, and obstructions shall be illuminated at nights, and all lights for this purpose shall be kept burning from sunset to sunrise.

All standard warning signs and barricades shall conform with standard details and "Construction Sign Requirements" appended to the special provisions, and shall be substantially constructed of wood or enameled metal. Wooden signs and barricades shall be painted with a prime, second and third coat of paint in accordance with Section 66. The final coat shall present a smooth semi-gloss finish.

Lettering and design shall be true to detail as shown on the standard details with sharp clear-cut lines and a glossy finish.

Except as set forth below coatings of wide-angle reflecting material applied to the entire background area of the signs shall be used when reflectorized signs are called for. These coatings shall be of the same color as indicated for such signs on the standard sign sheets and shall be retro-directive reflecting in character. Before application of the reflective coating, the background shall have been painted as specified above.

Signs indicated with a black background, shall have a black painted background, and the letters, symbols, or numerals shall be white, wide-angle reflecting coatings on the black painted background. The character of these reflective coatings shall be approved by the engineer.

Signs and barricades shall be maintained in first-class condition and any which may become scarred or damaged shall be repaired immediately or replaced as directed by the engineer.

After completion of any portion of the work rendering continued use of the signs or barricades unnecessary, the contractor shall at once remove, move, or change them, as directed by the engineer.

All signs and barricades shall be the property of the contractor and shall be disposed of by him upon completion of the contract.

In addition to the signs and barricades required above, or in the special provisions, the contractor shall furnish and erect, at his own expense, such other signs and safeguards as may be necessary to protect the public traffic, workmen, and the work on account of his operations.

Upon failure of the contractor to immediately provide, erect, and maintain, or to move or remove such barricades and the standard signs when ordered so to do by the engineer, the engineer shall be at liberty without further notice to the contractor or to the surety to provide, erect and maintain or to move or remove barricades and lights and to provide, erect and maintain or to move or remove standard signs and deduct the cost thereof from any payments due or to become due to the contractor.

The responsibility for the protection of the work, workmen, and public traffic will rest with the contractor and he shall be liable for damages and injury suffered by reason of the contractor's operations or any circumstances, conditions, actions, or negligence in connection therewith.

10.8 Alternate Methods. If the contractor desires to handle the work or traffic in a manner different from that outlined above, he shall submit in writing an outline of the plans he proposes. If, in the opinion of the engineer, such plan will provide for handling traffic in a satisfactory manner and at a cost which will not exceed the cost of providing for traffic as outlined above, permission may be granted to substitute the contractor's plan for the method set forth herein. Any changes made under these provisions shall be covered in writing on department change order forms.

10.9 Method of Measurement and Basis of Payment. Reimbursement for all costs of carrying traffic through construction operation shall be measured and paid for as follows:

When the proposal contains an item of "Flagman" the flagging as specified herein, in the special provisions, or ordered by the engineer, shall be measured by the number of hours that flagmen are actually used to direct traffic through construction operations, to stop traffic preparatory to piloting operations, and at each point where contractor's equipment enters or interferes with the traffic stream, and shall be paid for at the contract unit price bid per hour for "Flagman", which price shall be full compensation for all equipment, competent personnel and all incidentals necessary for the operation.

When the proposal contains the item of "Pilot Car," the piloting as specified herein, in the special provisions, or as ordered by the engineer, shall be measured by the number of hours that the pilot car and driver are actually used to lead traffic through the controlled areas, and shall be paid for at the contract unit price bid per hour for "Pilot Car," which price shall be full compensation for the vehicle and an experienced driver, all operating costs and depreciation.

If the proposal includes an item of "Maintain Base" it shall be paid for on a force account basis in accordance with Articles 4.5 and 9.5 of these specifications.

If the roadway excavation encountered in the construction of special detours or in the construction and removal of approaches to an existing highway, from

the new to the old grade, is deemed sufficient to require mention on the plans or in the special provisions, such excavation shall be measured and paid for as specified under Section 14, "Roadway and Drainage Excavation."

If the proposal contains an item for "Selected Detour Surfacing" in lieu of other materials covered in the standard specifications, selected detour surfacing shall be measured in tons, or cubic yards, in the hauling vehicles at the point of loading, as indicated by the unit stated in the proposal form. "Selected Detour Surfacing," measured as provided above, shall be paid for at the contract unit price bid per ton or cubic yard, as the case may be, which payment shall be full compensation for stripping of pit, crushing, screening, loading, hauling, placing materials on roadbed and compacting complete in place.

Liquid Asphalt, if required to prepare a surface for special detours or for laying of dust, shall be measured as specified in Section 32 "Road Application of Liquid Asphalt" and paid for at the contract unit price for the particular type of material required.

All other work necessary for the construction and maintenance of special detours shall be paid for on a force account basis in accordance with Article 4.5 and 9.5, except that equipment for which there is a contract price shall be paid for at the contract unit price bid per hour for the particular item of equipment required. The estimated amount of equipment and number of hours of operation shall be as indicated in the proposal form.

The particular items of equipment indicated in the proposal form, or the equivalent thereof, in good mechanical operating condition shall be paid for at the contract unit price per hour for the particular item of equipment required. The contract unit price bid per hour for equipment shall include skilled operators for each piece of equipment, fuel, lubricants, repairs, depreciation, and all expense incidental to the operation of the equipment. The time allowed for such equipment shall be the actual time the equipment is in operation on the work.

Unless otherwise provided, the costs of necessary watchmen, or flagmen, and of furnishing, erecting, maintaining, moving, removing, and replacing any signs or barricades, torches and lights, temporary markers or other devices, and furnishing flagging materials which are required herein, shown on the plans or otherwise ordered, or which may further be necessary for the protection of the traveling public, the work or the contractor's workmen, will not be paid for directly, but the cost thereof shall be included in the various pay items of the contract.

The contract lump sum price for "Signs" shall be full compensation for furnishing, erecting, maintaining, moving, removing, and disposing of the signs and barricades and for all labor, materials, tools, supplies, equipment, and incidentals necessary to complete the work.

When roadmix detours are called for on the plans or in the special provisions, roadmixing shall be done in accordance with Section 37 "Class B-1 Roadmix Surface" or Section 38 "Class C-1 Roadmix Surface" whichever applies.

SECTION 19 - EMBANKMENTS

19.3 Sequence of Operations: Change to read as follows:

Except as noted below, bridges and culverts shall preferably be completed in advance of grading operations. If not so completed, a sufficient length of embankment, as determined by the engineer, shall be omitted on each side of such structures to permit proper compaction of the embankment adjacent to the structure, in accordance with these specifications, after the structure has been completed.

Material surrounding bridges, pipe or box culverts shall be placed in accordance with the provisions set forth in Section 21 "Backfill".

Unless otherwise directed by the engineer or indicated on the plans, the contractor may, if he so elects, place the embankment before laying any pipe, in which case the embankment shall be placed at least two (2) feet above the proposed elevation of the top of the pipe or to the top of the embankment if this is less than two (2) feet above the proposed elevation of the top of the pipe. The trench shall then be excavated to the width set forth in Section 20 "Structure Excavation" for placing the pipe and proper backfilling. The pipe shall then be laid and the trench backfilled in accordance with the provision of Section 21 "Backfill," before more embankment or other material is placed thereon. If the contractor uses this method Structure Excavation and Backfill will be allowed as though the pipes were laid before placing the embankment.

19.6 Compaction. Change to read as follows:

Unless otherwise directed, where embankments are five (5) feet or less in height and before embankments are placed on natural foundations, except those composed essentially of rock or rocky materials, the top six (6) inches shall be plowed or scarified, moistened and compacted in conformity with the requirements as hereinafter set forth.

Compaction of embankments shall be done with approved pneumatic-tired rollers, multiple smooth-wheeled power rollers, or self-cleaning tamping rollers conforming to the requirements as set forth in Section 28, "Rolling." The type of roller used shall be suited to the character of the soil in the embankment. Types found unsuitable, after trial, in obtaining thorough compaction shall be replaced by another type when so ordered by the engineer.

The contractor shall provide at least one (1) tamping roller of not less than two (2) units and one (1) pneumatic-tired roller for each three hundred (300) cubic yards or fraction thereof, of material placed an hour. The quantity of material placed per hour shall be determined by averaging the total quantity of material placed in one (1) day or one (1) shift of operation, measured in excavation. Where tamping type rollers are used the contractor shall be permitted to use two (2) units for each three hundred (300) cubic yards of material placed in embankment per hour.

The rolling equipment shall be used when and as ordered by the engineer until the required compaction is obtained. The type of roller or rollers to be used will depend on the nature of the materials being compacted and the selection of type shall be at the descretion of the engineer.

Each layer of earthy materials shall be leveled, rolled and thoroughly compacted to a relative compaction of not less than ninety (90) percent as determined by the compaction test specified in Article 6.4 (d) of these specifications.

Embankment material which is not sufficiently moist to compact shall be sprinkled with water as directed by the engineer, either during excavation or when being placed in embankment. If the embankment material is rock, sufficient water shall be applied to flush the fine particles into the interstices of the rock.

The moisture content of the embankment material at the time of compaction shall be such that the specified density can be obtained.

The top six (6) inches of the completed subgrade, in cuts, shall be compacted to the same density as required for each layer of embankment.

At locations that are inaccessible to the roller, the embankment shall be brought up in layers of the thickness specified above and each layer shall be compacted thoroughly with mechanical tampers or by hand tamping.

The contractor shall use sufficient equipment of the type and weight ordered to obtain the required compaction in all areas including those that are inaccessible to ordinary rolling equipment.

When the proposal contains no item for "Rolling" compaction shall be obtained by routing the hauling and spreading equipment traffic over the embankment area in such a way that all portions of the layer are uniformly covered by the wheels and crawlers.

Embankments shall be maintained true to grade and cross section until the completion of the contract.

SECTION 21 - BACKFILL

21.3 Placing. Add the following new provision:

After the culvert has been installed backfill shall be placed in horizontal layers not exceeding four inches in depth, before compaction, and of such width that there shall be a berm of thoroughly compacted material on each side of the culvert at least as wide as the diameter of the pipe or outside vertical height of the box, except insofar as undisturbed material protrudes into this area.

21.4 Method of Measurement. Change paragraph (b) to read:

(b) For that portion above the top limits of structure excavation:

For full circle pipe culverts:

The volume to be measured shall not exceed the vertical dimension bounded by the original ground surface, and a horizontal plane six inches above the crest of the pipe; and the horizontal dimension shall be determined by the distance between vertical planes, equal to the diameter of the barrel of the pipe times three, but not in excess of the diameter plus ten feet.

For arch pipe culverts:

The volume to be measured shall not exceed the vertical dimension bounded by the original ground surface, and a horizontal plane six inches above the crest of the pipe; and the horizontal dimension shall be determined by the distance between vertical planes, equal to the horizontal diameter of the pipe plus two times the vertical diameter, but not in excess of the horizontal diameter plus ten feet.

For reinforced box culverts:

The volume to be measured shall not exceed the vertical dimension bounded by the original ground surface and a horizontal plane flush with the top of the structure; and the horizontal dimension shall be determined by the distance between vertical planes outside the walls of the structure, equal to the outside width plus two times the external height of the structure, but not in excess of the outside width plus ten feet.

The volume of the structure contained shall be deducted from the volume of backfill. Backfill above the top limits of structure excavation for headwalls for pipe culverts thirty-six (36) inches or less in diameter shall not be measured or paid for directly.

SECTION 27 - WATERING

27.3 Construction Methods. Add the following:

The contractor shall make all arrangements for securing water. He shall negotiate with owners of supply and sign and agreement with each owner prior to removing the water. He shall pay all royalties accruing under such agreements and shall also obtain any necessary rights of way for haul roads.

27.4 Method of Measurement. Add the following:

Developing of an adequate water supply, the furnishing of all necessary equipment for obtaining water from the source or sources and the furnishing on the job of equipment necessary to apply the water to the roadway in quantities directed by the engineer shall be measured for payment as a unit.

27.5 Basis of Payment. Change to read:

Furnishing of an adequate water supply, equipment for obtaining water from the sources, and for furnishing applying equipment on the job shall be paid for at the contract lump sum price for "Furnish Water Equipment," which price shall be full compensation for furnishing all labor, materials, tools, supplies, equipment, and incidentals necessary thereto.

The quantity of water acceptably applied to the roadway, measured as provided above, shall be paid for at the contract unit price per one thousand (1000) gallons (M gal) for "Water," which price shall be full compensation for furnishing

all labor, materials, tools, supplies, equipment, and incidentals necessary to complete the work.

The Department reserves the right to increase, or to omit all or any part of the estimated amount of water to be used, and no additional compensation shall be allowed by reason of such increase or decrease.

SECTION 28 - ROLLING

28.3 Method of Measurement and Basis of Payment. Self-propelled rollers, described herein, used for compaction, shall be paid for at the contract unit price per hour for "Power Roller," which price shall be full compensation for the roller with motive power, operator, fuel, lubricants, and for all labor, materials, tools, supplies, equipment, and incidentals necessary for satisfactory operation.

For the purpose of payment the unit of measurement for tamping and pneumatic-tired roller shall be a foot-hour. A foot-hour shall be considered as a net length of one (1) linear foot of double-axle roller or tamping drum, measured along its axis, between the outer face of the tires or the drum, used for compaction for one (1) hour.

The total number of double-axle rollers or tamping rollers used as directed by the engineer shall be paid for per foot-hour.

The foot-hours of Tamping Roller or Pneumatic-tired roller, as measured above, shall be paid for at the contract unit price bid per foot-hour for "Tamping Roller," "Pneumatic-tired Roller" or "Tamping or Pneumatic-tired Roller," as indicated in the proposal, which payment shall include motive power for its propulsion, operator, fuel, lubricants, and for all labor, materials, tools, supplies, equipment, and incidentals necessary for satisfactory operation.

The Department reserves the right to increase, or to omit all or any part of the estimated amount of rolling, and no additional compensation shall be allowed by reason of such increase of decrease.

SECTION 30 - GRAVEL BASE COURSES

30.3 Placing. Change the 3rd paragraph to read:

Initial spreading of Type 1 and Type 2 gravel base shall be accomplished by dumping the material from hauling vehicle directly from the tail gate onto the roadbed or into approved spreading devices.

SECTION 33 - PRIME COAT

33.1 Description. Change to read:

This item shall consist of the application of liquid asphalt to that portion of the roadway upon which plantmix surfacing is to be placed and, if necessary, covering the application with sand blotter.

33.3 Construction Methods. Add the following:

The prime coat shall be allowed to penetrate and cure for a period of not less then twenty-four (24) hours before the application of any sand blotter, this period may be shortened by the engineer if the nature of the base being primed and favorable conditions of weather result in proper curing before the stipulated time has elapsed.

Prime coat shall be placed one half width at a time as directed by the engineer. Suitable means shall be provided to keep traffic off the freshly primed base as necessary to prevent picking up. The second half shall be primed as soon as traffic can travel over the first half without damaging it.

33.5 Basis of Payment. Add the following:

The Department reserves the right to increase, or to omit all or any part of the estimated amount of sand blotter to be used, and no additional compensation shall be allowed by reason of such increase or decrease.

SECTION 34 - SEAL COAT

Change entire specification to read:

34.1 Description. This item shall consist of the application of emulsified asphalt or liquid asphalt on a compacted and bonded bituminous surface and if required, covering the application with a sand blotter.

34.2 Materials. The materials used shall be those prescribed for the several items which constitute the finished work and shall comply with all the requirements for such materials as set out in this specification, and in Part III "Material Details," specific references to Part III or as follows:

Sand Blotter - - - - - - - - - - - - - - - - - Section 82
Liquid Asphalt - - - - - - - - - - - - - - - - Section 84
Emulsified Asphalt - - - - - - - - - - - - - - Section 85

34.3 Construction Methods. Immediately, before applying the asphaltic material, the surface to be seal coated shall be thoroughly cleaned of all dirt and loose material by sweeping with power brooms supplemented by hand brooms if necessary.

The kind of asphaltic material and the rate of application shall be as indicated on the plans or in the special provisions or as ordered by the engineer and shall be applied in accordance with the specification for "Road Application of Liquid Asphalt," Section 32.

After the asphaltic material has penetrated the surface, the treated area shall be covered where necessary with sand blotter in sufficient quantity to absorb any excess asphaltic material and prevent picking up by traffic.

34.4 Method of Measurement. Asphaltic material shall be measured as specified in Section 32.

The quantity of sand blotter to be paid for shall be the number of tons or the number of cubic yards measured in the hauling vehicles at the point of loading as indicated by the unit set forth in the proposal conforming to all requirements in the completed and accepted work.

34.5 Basis of Payment. Asphaltic material, measured as provided above, shall be paid for at the contract unit price per ton for the particular type of material required.

Sand blotter, measured as provided above, shall be paid for at the contract unit price bid per ton or per cubic yard for "Sand Blotter".

Payment specified above shall be full compensation for all labor, materials, tools, supplies, equipment, and incidentals necessary to complete the work.

The Department reserves the right to increase, or to omit all or any part of the estimated amount of sand blotter to be used, and no additional compensation shall be allowed by reason of such increase or decrease.

SECTION 35 - CLASS A-1 SURFACE TREATMENT

Change the entire specification to read:

35.1 Description. This item shall consist of a surface covering of asphaltic material and screenings applied on a previously compacted and bonded bituminous surface complying to cross section and grade shown on the plans.

35.2 Materials. The materials used shall be those prescribed for the several items which constitute the finished work and shall comply with all the requirements for such materials as set out in this specification, and in Part III "Material Details", specific references to Part III are as follows:

Screening - Section 74
Liquid Asphalt- Section 84
Emulsified Asphalt- Section 85

35.3 Construction Methods. Immediately, before applying a surface treatment, the surface to be treated shall be thoroughly cleaned of all loose particles, earth and other objectionable materials by sweeping with power brooms, supplemented by hand brooms if necessary.

The kind of asphaltic material, the rate of application and the amount of screenings to be spread shall be as indicated on the plans or in the special provision or as ordered by the engineer and the asphaltic material shall be applied in accordance with the specification for "Road Application of Liquid Asphalt," Section 32.

Emulsified asphalt shall be applied at a temperature of between 120° F. and 150° F.

Screenings shall be spread at the rate specified by means of an improved mechanical spreader so designed that the material shall be spread in a thin uniform

sheet. In order to eliminate dust film, screenings shall be moistened with water before being applied. The rate of spread shall be adjustable and shall be changed as directed by the engineer. In spreading the screenings, the equipment used shall be so operated that the fresh asphaltic material will be covered before the equipment wheels come upon it.

Dragging shall follow immediately behind the spreading to evenly distribute the cover material before rolling. Rolling shall follow immediately behind the dragging operations to properly imbed the material in the soft asphaltic binder. The drag shall be a wire chain-link fencing drag of suitable width and length or may be a light weight commercial wire tuft drag of suitable design and dimension. Rolling with a power roller weighing not less than eight (8) tons shall commence at the outer edges and proceed toward the center of each spread of asphalt and shall be continued until the screenings are thoroughly set into the asphaltic binder.

When emulsified asphalt is prescribed as the asphaltic material to be used, the following limitations shall apply as ordered and directed by the engineer:

1. In no case shall application of cover aggregate be delayed until the emulsion breaks completely.

2. During periods of high humidity the work shall be suspended until humidity conditions are normal and weather conditions favorable.

3. Newly completed surface treatment shall not be opened to traffic during rain or periods of damp weather with a temperature of less than 65° F.

4. When sudden rain or periods of damp weather occur prior to the thorough setting of the surface treatment, the surface shall be adequately protected by closing to traffic or where closing is not feasible by flagging and piloting traffic through the area at a speed of not more than ten (10) miles per hour. Such control of traffic shall be maintained until in the opinion of the engineer traffic may use the surface without damage thereto.

Costs, incurred by the contractor, to protect the surface during periods enumerated above will not be paid for directly, but are designated as necessary to satisfactorily complete the work, and the contract unit prices bid for the materials with which "Surface Treatment" is constructed shall be full compensation for the protection as ordered and prescribed above.

Asphaltic Material shall not be applied in advance of spreading screenings over a greater distance than can be finished before any setting or hardening of the asphaltic binder occurs. The distance over which the asphaltic material is spread in advance of finishing shall be determined by the engineer.

The finished surface shall be smooth and uniform in appearance, thoroughly bonded and free from bare spots, ruts, humps, depressions or other irregularities.

35.4 Method of Measurement. Asphaltic Material shall be measured as specified in Section 32.

The quantity of screenings for surface treatment to be paid for shall be the number of tons conforming to all the requirements in the completed and accepted work.

35.5 Basis of Payment. Asphaltic material, measured as provided above, shall be paid for at the contract unit price bid per ton for the particular type of material required.

Screenings, measured as provided above, shall be paid for at the contract unit price bid per ton for "Screenings, one-half inch" or "Screenings, three-eighths inch" as the case may be, which price shall include moistening.

Payment specified above shall be full compensation for all labor, materials, tools, supplies, equipment, and incidentals necessary to complete the work.

SECTION 37 - CLASS B-1 ROADMIX SURFACE

Section 37.2 Materials. Add the following:

When two or more grades of one type of bituminous material are specified on the plans or in the special provisions, the grade to be used shall be determined by the engineer immediately prior to the date that delivery of material is ordered by the contractor.

37.3 Placing Aggregate. Change to read:

When all or part of the aggregate required for the construction of the roadmix surface is to be placed, the surface of the road shall be scarified lightly to a depth just sufficient to permit elimination of irregularities and reshaping true to grade and cross section. The required amount of aggregate shall then be placed and compacted in accordance with the specification for "Gravel Surface Course", Section 31.

When the aggregate is to be treated with liquid asphalt immediately after being placed, the compaction requirement on the portion to be incorporated in the mix shall not be required.

37.5 Equipment. Add the following:

Either traveling or stationary mixing plants or other equipment of proven performance may be used by the contractor in lieu of the equipment outlined above, if advance written approval is given by the engineer, and if the contractor complies with such requirements as the engineer may consider necessary to insure results that shall be at least equal to the results that would be obtained by use of the specified equipment.

37.7 Mixing. Change to read as follows:

After the final application of liquid asphalt and the mixing specified above, the entire mass of material to be mixed shall be moved by heavy blade graders into

a windrow near the center of the road and then mixed by the assemblage of mixing units, by blading the material from side to side of the road, or by munipulations producing equivalent results until all the particles are coated with liquid asphalt and the whole mass has a uniform color. During this operation the blades shall be set as to cause a revolving motion of the mixture. The mix shall be deemed complete when all free liquid asphalt has been scraped from the base and the mixture is free from lumps and spots with excess liquid asphalt. If the mixture is found to contain an excess of liquid asphalt, additional untreated surfacing material shall be loosened and incorporated into the mix, and if it is found to contain a deficiency of liquid asphalt, the necessary additional amount of liquid asphalt shall be applied in the same manner as the original applications. In either case the mixing shall be resumed and continued until the entire mass in completely mixed. Oversized rocks or stones appearing in the mix from any cause shall be removed when exposed and shall be disposed of as directed by the engineer.

If a travelling type mixer is used which does not elevate the windrowed material above and free from the roadway during the mixing operation the windrow shall be completely turned over with blade graders or other approved equipment between each successive pass of the mixing machine.

If, before the mixing process is complete, the mixture should become wet due to rain or other causes, the mixing operation shall be continued until it has dried out. The mixture shall be deemed suitably dried out when the moisture content of the mix is not more than one and one-half ($1\frac{1}{2}$) percent by weight.

Before the finished mixture is finally spread for compaction, a triangular cut shall be made with a blade grader at each edge of the base course to provide for a thickened edge of asphaltic mixture. The cut shall be approximately two (2) inches deep at the outer edge and sloped to zero, two (2) feet in towards the center. In making a cut the excavated material shall be thrown to the shoulder in a small windrow against which the mixture shall be spread.

37.9 Compacting. Change to read as follows:

During the spreading operation and after the mixture has been spread as specified, it shall be compacted by means of rollers, which operation shall begin at the edges of the course and progress towards the center parallel to the center line of the roadway, overlapping in successive passes by at least one half ($\frac{1}{2}$) the width of the roller. Rolling shall continue until the surface is of uniform texture and degree of compaction and is true to grade and cross section. Pneumatic-tired-rollers weighing at least three (3) tons and so constructed as to permit the weight to be increased to seven (7) tons shall be used to compact each layer, except the top layer. The tires shall be of the same size and inflated to the same pressure and the load so distributed so as to produce uniform compaction. The upper or final layer shall be rolled with steel tired tandem or three-wheeled rollers. Should unsatisfactory areas develop during compaction they shall be corrected as directed by the engineer.

37.12 Method of Measurement. Change to read as follows:

Liquid Asphalt shall be measured as specified in Section 32, "Road Application of Liquid Asphalt."

Mixing shall be measured in miles along the center line of the roadway and no extra allowance shall be made for widened sections unless otherwise provided in the special provisions.

Mixing of intersections and all types of approaches shall be measured in square yards. Such measurement shall include only areas outside limits of the nominal width specified for the roadway surfacing.

37.13 Basis of Payment. Change to read as follows:

Aggregate, when required shall be measured and paid for as specified for the particular type of aggregate placed.

Liquid asphalt used in the mix and measured as provided above shall be paid for at the contract unit price bid per ton for the particular type of material applied.

Mixing, measured as provided above, shall be paid for at the contract unit price bid per mile for "Roadmix".

Mixing of intersections and approaches, measured as provided above, shall be paid for at the contract unit price bid per square yard for "Roadmix Intersections". When the proposal does not include an item for "Roadmix Intersections", compensation for this work shall be considered as being included in the contract prices bid for other items of the work.

Seal coat shall be measured and paid for as specified in Section 34 "Seal Coat".

Payment specified above shall constitute full compensation for mixing and compacting the surface and for all labor, material, tools, equipment, supplies, and incidentals necessary to complete the work.

SECTION 41 - CLASS F-2 PLANTMIX SURFACE

41.6 Placing. Add the following:

Plantmix surfacing for approaches may be deposited from the tail gates of vehicles and spread with blade graders or other approved methods.

Diesel or similar oil shall not be used on roller wheels to prevent adherence to the asphaltic materials. Water shall be used for this purpose if a lubricant is necessary.

41.7 Intersections. Change to Read:

Intersecting roads and approaches shall be surfaced with plantmix surfacing as indicated on the plans or ordered by the engineer in accordance with these specifications.

41.8 Surface Treatment. Change to Read as follows:

After the surface has been finished and under traffic for a period of time sufficiently long in the opinion of the engineer, to have thoroughly compacted the entire surface, a surface treatment shall be applied to the roadway area indicated on the plans, in the special provisions or as directed by the engineer in accordance with Section 35 "Class A-1 Surface Treatment".

SECTION 45 - CONCRETE STRUCTURES

45.1 Description. Change to read as follows:

This item shall consist of furnishing and placing Portland Cement Concrete in bridges, culverts, headwalls, retaining walls, slope pavements, and all other types of concrete structures. The concrete shall be composed of Portland Cement, fine aggregate, coarse aggregate, and water, proportioned and mixed as specified herein. The masonry shall be of a class and shall conform to the shapes and dimensions shown on the plans or ordered in writing by the engineer.

45.2 Materials. Change to read as follows:

The materials used shall be those prescribed for the several items which constitute the various mixtures and shall conform in all respects with the requirements for such materials as set out in Part III "Material Details". Specific references to Part III are as follows:

Water	Section 70
Coarse Aggregate for Portland Cement Concrete	Section 76
Fine Aggregate for Portland Cement Concrete	Section 81
Portland Cement	Section 89
Asphalt for Waterproofing	Section 88
Sheet Copper	Section 91
Expansion Joint Filler	Section 105

When air-entrained concrete is specified, the contractor, shall select one of the admixtures listed hereinafter or an approved equal.

Either prior to or at any time during construction, the engineer may require that the admixture selected by the contractor be further tested to determine its effect upon the strength of the concrete. When so tested, compressive stength of concrete made with cement and aggregates and in the proportions to be used in the work and containing the admixture under test in an amount sufficient to produce from three (3) to six (6) percent entrained air in the plastic concrete, in seven (7) days, shall not be less than eighty-eight (88) percent of the strength of concrete made with the same materials and with the same cement content and consistency but without the admixture.

The percentage reduction in strength shall be calculated from the average strength of at least five (5) standard six (6) inch by twelve (12) inch cylinders of each type of concrete. Specimens shall be made and cured in the laboratory in accordance with the current ASTM Standard Method of Making and Curing Concrete Compression and Flexure Specimens in the Laboratory C-192 and shall be tested in accordance with the current ASTM Standard Method of Tests for Compressive Strength of Molded Concrete Cylinders C-39. The percentage of entrained-air shall be determined in accordance with the current ASTM Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method C-231.

Admixtures failing to meet the above requirements may be rejected.

LIST OF ADMIXTURES

Trade Name	Manufactured by	Address
Aerolith	Sonneborn & Sons, Inc.	New York, N. Y.
Airalon AEA	Dewey & Almy Chem. Co.	Cambridge, Mass.
Ayr-Trap #1	A. C. Horn Co., Inc.	Long Island City, N. Y.
Ayr-Trap #2	A. C. Horn Co., Inc.	Long Island City, N. Y.
Darex AEA	Dewey & Almy Chem. Co.	Cambridge, Mass.
Durair	Techkota Co.	Inglewood, Calif.
Kutwell 40	Esso Standard Oil Co.	New York, N. Y.
Nacconal NR	Allied Chem. & Dye Corp.	New York, N. Y.
Nacconal Z	Allied Chem. & Dye Corp.	New York, N. Y.
N-Tair	Newport Industries	New York, N. Y.
Portite	Hopper Products, Inc.	New York, N. Y.
Pozzolith 4A	Master Builders Co.	Cleveland, Ohio
Pozzolith 5A	Master Builders Co.	Cleveland, Ohio
Pozzolith 8	Master Builders Co.	Cleveland, Ohio
Pozzolith 10A	Master Builders Co.	Cleveland, Ohio
Protex AEA	Autolene Products Co.	Denver, Col.
Ricco	Richard Sales Corp.	Jersey City, N. J.
Santomerse #1	Monsanto Chem. Co.	St. Louis, Mo.
Santomerse S	Monsanto Chem. Co.	St. Louis, Mo.
Sika AER	Sika Chemical Co.	Passaic, N. J.
Spray-O-Bond	Spray-O-Bond Co.	Milwaukee, Wis.
Specs	E. L. Moore Co.	Pasadena, Calif.
Ultrawet 30E	Atlantic Refining Co.	Philadelphia, Pa.
Ultrawet K	Atlantic Refining Co.	Philadelphia, Pa.
Veriset	Verapon, Inc.	New York, N. Y.
Vinsol NVX	Hercules Powder Co.	Wilmington, Del.

The contractor will be required to follow an approved procedure for adding the specified amount of air-entraining admixture to each batch and will be held responsible for its uniform operation during the progress of the work. The contractor shall provide separate approved scales for such admixtures as are to be proportioned by weight and accurate measures for such admixtures as are to be proportioned by volume.

45.3 Classification. Change to read as follows:

Concrete shall be of eight (8) classes: Class A, Class B, Class C, and Class D, for concrete without air-entraining, and Class AA, Class BA, Class CA, and Class DA for concrete with air-entraining. Each class of concrete shall be used in that part of the structure in which it is called for on the plans or where directed by the engineer. The following requirements shall govern unless otherwise prescribed in the special provisions or shown on the plans.

Class A or Class AA shall be used for reinforced substructures, retaining walls, slope pavement and superstructures.

Class B, or BA shall be used for massive substructures, gravity walls and backfill with little or no reinforcing.

Class C or CA shall be used for backfill and very massive unreinforced sections.

Class D or DA shall be used for parts of superstructures and substructures where a small aggregate is required.

The following sizes of coarse aggregate shall be used for the various classes of concrete previously designated.

Class A and Class AA - - - - - - - - - - - No. 4 to 1 $\frac{1}{2}$ inch
Class B and Class BA - - - - - - - - - - - No. 4 to 2 $\frac{1}{2}$ inch
Class C and Class CA - - - - - - - - - - - No. 4 to 3 inch
Class D and Class DA - - - - - - - - - - - No. 4 to 3/4 inch

45.6 Equipment. Change to read as follows:

Methods employed in performing the work, and all equipment, tools, and machinery used for handling materials and executing any part of the work, shall be subject to the approval of the engineer. All equipment necessary shall be on hand and approved before concrete operations are begun by the contractor.

Weighing equipment for aggregates shall be accurate within an allowable error of not more than five-tenths (5/10) of one (1) percent of all loads. It shall be arranged so as to allow compensation to be made for changes in weight of moisture contained in the aggregates, and to permit the convenient removal of overweight material from the weighing hopper. The scales shall be either of the beam or springless dial type. A suitable device consisting of a graduated beam or dial shall be used to register at least the last 100 pounds of either of the aggregates required for the batch. The value of the minimum graduation shall not be greater than two (2) pounds.

Water measuring equipment shall be capable of accurate measurement with an allowable error of not more than two (2) percent and shall be so arranged that the accuracy of measurement shall not be affected by variations in pressure in the water supply line. The water measuring equipment shall preferably include an auxiliary tank from which the measuring tank shall be filled.

Portland cement concrete shall be mixed in batch mixers of an approved design, which may be either of the revolving drum or pug mill type. The mixer shall be equipped with an approved timing device which will automatically lock the discharging device so as to prevent the emptying of the mixer until the materials have been mixed the minimum specified time.

Transit type mixers may be used when approved by the engineer. Approval will be given if investigation of the plant and delivery system indicates that concrete delivered to the site of the project will conform in all respects with the requirements of the specifications.

The mixer shall be a closed, water tight, revolving drum. It shall be suitably mounted and shall be fitted with blades capable of combining all ingredients into a thoroughly mixed and uniform mass, and of discharging the concrete without segregation.

Mixers shall be examined daily for changes in condition due to accumulation of hardened concrete or mortar or to wear of blades. When any such change of condition is found, the faulty equipment shall be corrected before its further use is allowed.

The mixing speed of the drum shall be not less the four (4) nor more than fifteen (15) revolutions per minute. The agitating speed of the drum shall be not less than two (2) nor more than six (6) revolutions per minute.

Each truck shall be equipped with an approved device for registering the number of revolutions made by the drum during the interval between introduction of water into the drum and discharge of the concrete from the mixer. The drum shall revolve continuously during this interval.

Each mixer shall have attached thereto in a prominent place a metal plate or plates on which is plainly marked the various uses for which the equipment is designed, the capacity of the drum, or container, in terms of the volume of the mixed concrete and the speed of rotation of the mixing drum or blades.

The truck mixers shall have a water measuring device to measure accurately the quantity of water for each batch. The device shall be mounted on the truck mixer or located at the point of taking on the water. The device shall permit ready access and ready determination of the amount of water used.

45.8 Forms. Change the 6th paragraph to read as follows:

Forms shall be filleted at all sharp corners. Triangular molding used for fillets shall have two (2) equal sides. In general, the width of the equal sides of moldings shall be three-fourths (3/4) inch; for massive work, such as heavy pier copings and colums, the width shall be one and one-half ($1\frac{1}{2}$) to two (2) inches. Top edges of walls, curbs and slabs shall be rounded with an edging tool to a radius of one-half ($\frac{1}{2}$) to three-fourths (3/4) inch. All edges of concrete rails and rail posts to be rounded to a radius of one-eighth (1/8) to one-quarter ($\frac{1}{4}$) inch.

45.9 Proportioning. Change the table to read as follows:

Class	Coarse Aggregate Used	Weight of Fine Aggregate Per Bag of Cement — Minimum Pounds	Maximum Pounds	Total Weight Aggregate Per Bag of Cement
A	* Rounded	190	225	570
A	* Angular	195	225	510
AA	* Rounded	175	210	540
AA	* Angular	180	210	480
B	* Rounded	210	250	730
B	* Angular	220	250	640
BA	* Rounded	200	235	700
BA	* Angular	205	235	610
C	* Rounded	280	320	900
C	* Angular	295	320	800

Weight of Fine Aggregate (Cont.)

Class	Coarse Aggregate Used	Per Bag of Cement — Minimum Pounds	Per Bag of Cement — Maximum Pounds	Total Weight Aggregate Per Bag of Cement
CA	* Rounded	260	300	820
CA	* Angular	280	315	770
D	* Rounded	230	250	530
D	* Angular	230	250	480
DA	* Rounded	200	225	480
DA	* Angular	200	225	430

* When coarse aggregate contains some rounded and some angular particles an interpolation shall be made between the amounts shown.

45.11 Consistency. Change table to read as follows:

Class A and Class AA	2 to 4 inches
Class B and Class BA	1 to 3 inches
Class C and Class CA	1 to 3 inches
Class D and Class DA	2 to 4 inches

45.12 Mixing. Change to read as follows:

Unless otherwise authorized, concrete shall be machine mixed at the site. Concrete shall be thoroughly mixed in a batch mixer of an approved size and type. It shall be mixed only in such quantities as are required for immediate use, and any which has developed an initial set, or which is not in place in the forms within 30 minutes after the water has been added, shall not be used. No retempering of the concrete shall be allowed. Concrete shall be thoroughly mixed for a period of not less than one and one-quarter minutes after all materials, including water, are in the mixer. During such period, the mixer shall be operated at speeds specified by the manufacturer. The entire contents of the mixer shall be removed before materials for the succeeding batch are placed therein. Concrete mixed in transit mixing equipment shall be agitated continuously after mixing starts until it is all discharged from the drum.

The volume of mixed concrete permitted in the drum shall not exceed the manufacturer's rating on the capacity plate; nor 50 percent of the gross volume of the drum in the case of top-door loading truck mixers; nor 57-1/2 percent in the case of end loading truck mixers.

When wash water is used as a portion of the mixing water for the succeeding batch it shall be accurately measured and taken into account in determining the amount of additional mixing water required. When wash water is carried on the truck mixer, it shall be carried in a compartment separate from that used for carrying or measuring the mixing water.

When water, cement and aggregate are introduced into a truck mixer drum at the loading plant the drum shall revolve without interruption until the concrete is discharged therefrom. Mixing shall commence immediately after the introduction of water and shall continue for at least fifty (50) revolutions of the drum at mixing

speed. Not more than one hundred fifty (150) revolutions of the drum shall be of a speed in excess of the drum's agitating speed. Any other revolutions shall be at agitating speed.

The interval between introduction of water into the drum and the final discharge of concrete from the truck mixer shall not exceed one (1) hour.

The interval between charging of the mixer drum with cement and aggregates and the introduction of water shall not exceed one (1) hour, when water is introduced in transit.

When water is to be introduced to the truck mixer drum at the site of the concrete construction the requirements above shall govern.

The organization supplying concrete shall have sufficient plant capacity and transporting apparatus to insure continuous delivery at the rate required. The rate of delivery of concrete shall be such as to provide for the proper handling, placing and finishing of the conrete. The rate shall be such that the interval between batches shall not exceed thirty (30) minutes. The methods of delivery and handling of concrete shall be such as will facilitate placing with a minimum of rehandling and without damage to the structure or the concrete.

Concrete may be partially mixed by central plant mixing for the purpose of shrinking the batch and the mixing completed by truck mixing.

Each load of ready-mixed concrete shall be accompanied by a delivery ticket completely filled out by an authorized representative of the Department. Upon arrival at the job the driver shall present one copy of the delivery ticket to the engineer or inspector.

The central plant mixing shall be in accordance with the requirements of these Specifications.

45.14 Handling and Placing Concrete. Change the 4th paragraph to read as follows:

All concrete shall be compacted by means of high frequency internal vibrators of a type approved by the engineer, with the exception that pipe culvert headwalls, curb and gutter, sidewalk, slope pavement, and related minor structures may be compacted by hand methods. The minimum frequency of the vibrators shall be not less than four thousand five hundred (4,500) impulses per minute. The intensity of vibration shall be such as to visibly affect a mass of concrete of one (1) inch slump over a radius of at least eighteen (18) inches. The number of vibrators employed shall be ample, as determined by the engineer, to consolidate the incoming concrete to the proper degree within fifteen (15) minutes after it is deposited in the forms. Vibrators shall be manipulated so as to thoroughly work the concrete around the reinfocement and into corners and angles of the forms. Vibration shall be applied at the point of deposit and in the area of freshly deposited concrete. Vibrators shall be inserted and drawn out of concrete slowly. The vibration shall be of such duration and intensity to thoroughly compact the concrete, but shall not be continued so as to cause segregation. Vibration shall be supplemented by such spading as is necessary to insure smooth surfaces and dense concrete along the form surfaces and in corners and locations impossible to reach with a vibrator.

45.18 Curing. Change to read as follows:

Freshly poured concrete shall be kept continuously wet for a period of not less than seven (7) days by covering with heavy absorbent mats or wet earth, by ponding, by continuous sprinkling, or by means of an approved impervious membrane. If Type III cement is used, the curing period may be reduced as directed by the engineer. When absorbent mats are used, they shall be wet sufficiently to keep the surface adjacent to the concrete surface moist at all times. After the period of water curing, concrete surfaces shall be protected from the direct rays of the sun for an additional three days. During this time the surfaces may be allowed to dry out slowly. In no case shall alternate wetting and drying of the concrete be permitted. In cold weather the period of curing shall be extended as directed by the engineer.

Absorbent mats for curing concrete shall consist of two layers of fabric with a cotton bat filler. The fabric shall be of a quality and texture to readily permit absorption of water by the bat. The cotton bat shall be made of raw cotton, cotton comber waste, cotton card stip waste, or other approved material, and shall weigh not less than twelve (12) ounces per square yard. The mat shall be tufted or quilted to insure an even distribution of the bats within the fabric layers.

The membrane shall consist of a practically colorless impervious liquid of a type approved by the engineer. Any membrane material which would alter the natural color of the structure will not be permitted.

The liquid shall be applied under pressure with a spray nozzle in such a manner as to cover the entire surface to be cured with a uniform film, and shall be of such character that it will harden within thirty (30) minutes after application. The amount of liquid applied shall be ample to seal the surface thoroughly. Application of the liquid shall be made immediately after forms are removed and finishing operations have been completed. Prior to the application of the liquid the concrete shall be protected and kept moist as required herein.

45.19 Removal of Falsework and Forms. Change to read as follows:

In the determination of the time for removal of falsework, forms, and housing, and the discontinuance of heating, consideration shall be given to the location and character of the structure, the weather and other conditions influencing the setting of the concrete, and the materials used in the mix.

Methods of form removal likely to cause overstressing of the concrete shall not be used. In general, the forms shall be removed from the bottom upwards. Forms and their supports shall not be removed without the approval of the engineer. Supports shall be removed in such a manner as to permit the concrete to uniformly and gradually take the stresses due to its own weight.

When required by the engineer, field operations shall be controlled by beam and cylinder tests and the removal of forms, supports, and housing, and the discontinuance of heating and curing may be begun when the modulus of rupture or the compressive strength reaches the value which shall be fixed by the engineer for the particular method of testing which is to be used. The beams or cylinders shall be cured under conditions which are not more favorable than the most unfavorable conditions for the portions of the concrete which the specimens represent.

If the field operations are not controlled by beam or cylinder tests, the following period, exclusive of days when the temperature is below forty (40) degrees,F. shall apply to removal of forms:

Arch centers	14 days
Centering under beams	14 days
Floor Slabs	14 days
Walls	1 day
Columns	5 days
Side of beams and all other parts	1 day

If Type III cement is used, this period may be reduced as directed by the engineer.

In order to make possible the obtaining of a satisfactory surface finish, forms for ornamental work, railings, and parapets shall be removed in not less than twelve (12) nor more than forty-eight (48) hours depending upon the weather conditions.

Forms shall always be removed from columns before removing shoring from beneath beams and girders in order to determine the condition of the concrete in the columns.

No superimposed load, either live or dead, shall be allowed upon the structure within twenty-eight (28) days or until test cylinders show a strength equal to the required twenty-eight (28) day strength. Falsework and centering for arches shall not be struck until the fill back of the abutments has been placed up to the spring line. Falsework for rigid frame structures shall not be removed until the fill has been placed back of the vertical legs as specified in Section 21, "Backfill".

45.21 Finishing. Add the following:

Finishing of concrete may be eliminated, except on curbs and concrete rails and rail posts of bridges, provided that the surface of the concrete after removal of forms, is dense, smooth and even, is without stone or sand pockets, has no form marks, or has minor form marks arranged in symmetrical panels, and the whole presents a neat, pleasing appearance. If, in the opinion of the engineer, such surface is secured, the only work required will be pointing of tie bolt holes with mortar as required in Article 45.20. Should there be any blemishes which require patching or should there be excessive form marks or other defects the entire exposed surface shall be stoned as required above or as directed by the engineer.

45.25 Basis of Payment. Change to read as follows:

The yardage, determined as provided above, shall be paid for at the contract unit price bid per cubic yard for "Class A Concrete," "Class AA Concrete," "Class B Concrete," "Class BA Concrete," "Class C Concrete," "Class CA Concrete," "Class D Concrete," "Class DA Concrete," or "Cyclopean Concrete" as the case may be. If such an item is shown in the proposal form, concrete slope pavement shall be paid for at the contract unit price bid per cubic yard for "Class A Concrete Slope Pavement" or "Class AA Concrete Slope Pavement" as the case may be; concrete railing shall be paid for at the contract unit price bid per linear foot for "Concrete Rail". Such payment shall be full compensation for the concrete; for all materials including expansion

joint filler, non-metallic drains, timber bumpers, forms, falsework, placing and finishing; and for all labor, materials, tools, supplies, equipment, and incidentals necessary to complete the item. Reinforcing steel, including metal drains, water stops, expansion joint angles, when there is no item for structural steel in the proposal, shall be measured and paid for as specified in Section 46.

SECTION 46 - REINFORCING STEEL

46.5 Fabrication. Change to read as follows:

Bent bar reinforcement shall be cold bent to the shape shown on the plans; and, unless otherwise provided on the plans or by authorization, bends shall be made in accordance with the following requirements:

Stirrups and tie bars shall be bent around a pin having a diameter not less than two (2) times the minimum thickness of bar. Bends for other bars shall be made around a pin having a diameter not less than six (6) times the minimum thickness, except that for bars larger than one (1) inch the bend shall be made around a pin of eight (8) bar diameters.

Reinforcing bars shall be cut and bent at the mill or shop before shipment to the work. Bending in the field will not be permitted except to correct errors, deformations due to handling, or minor omissions in shop fabrication.

Bar reinforcement shall be shipped in standard bundles, tagged and marked in accordance with the Manual of Recommended Practice for Detailing Reinforced Concrete Highway Structures of the American Association of State Highway Officials.

46.8 Splicing. Change to read as follows:

All reinforcement bars shall be furnished in the full lengths indicated on the plans. Splicing of bars, except where shown on the plans, will not be permitted without the written approval of the engineer. Splices shall be staggered as far as possible. Unless otherwise shown on the plans, bars near the top of beams and girders having more than twelve (12) inches of concrete under the bars shall be lapped thirty-five (35) diameters and all other bars shall be lapped twenty (20) diameters to make the splice. In lapped splices, the bars shall be placed in contact and wired together. Welding of reinforcing steel shall be done only if detailed on the plans or authorized by the engineer in writing. Welding shall conform to the specifications for Welded Highway and Railway Bridges of the American Welding Society.

Sheets of mesh reinforcement shall overlap each other sufficiently to maintain a uniform strength and shall be securely fastened at the ends and edges. The edge lap shall not be less than one (1) mesh in width.

46.10 Method of Measurement. Change to read as follows:

The quantity of bar reinforcing steel to be paid for shall be the total weight in pounds actually in place, as shown on the plans or revised by the authority of the engineer, based on calculated weights shown in the table below. The weight paid for shall not include the extra metal used when bars larger than those specified are substituted by permission of the engineer, the extra metal necessary for splices not indicated on the plans, nor weight of any device used to support or fasten the steel in its correct position. In the case of structures of reinforced

concrete where there is no proposal item for structural steel, such minor metal parts as expansion joints, bolts, drains, and the like shall, unless otherwise specified, be measured as reinforcement.

If such an item is shown in the proposal form, the quantity of mesh reinforcement to be paid for shall be the number of square yards computed by multiplying the width of the section to be reinforced by its length. No allowance shall be made for laps.

The calculated weights of plain and deformed bars shall be based on the following table:

Size No.	Nominal Diameter In Inches	Weight Per Foot In Pounds
2	0.250	0.167
3	0.375	0.376
4	0.500	0.668
5	0.625	1.043
6	0.750	1.502
7	0.875	2.044
8	1.00	2.670
9	1.128	3.400
10	1.270	4.303
11	1.410	5.313

SECTION 52 - PIPE CULVERTS

52.2 Materials. Change to read as follows:

All materials shall conform to the requirements of Part III, Material Details, Specific references to Part III are as follows:

Corrugated Metal culvert pipe, Siphons, and Plates for Structural Plate Pipe and Arches - - - - - - - - - - - - - - - - - - - Section 94

Vitrified clay culvert pipe - Section 96

Reinforced concrete culvert pipe- - - - - - - - - - - - - - - - - - Section 97

Plain Concrete culvert pipe - Section 98

52.6 Laying Sectional Plate Pipe. Change article title and first paragraph as follows:

52.6 Laying Structural Plate Pipe.

Where structural plate pipe is to be installed in new embankment, the embankment shall be constructed to the elevation of the third point of the diameter of the pipe, after which the trench shall be excavated and the pipe installed.

52.7 Laying Vitrified Clay, Reinforced Concrete, or Plain Concrete Pipe. Add the following:

When using T & G Reinforced or Plain concrete pipe, the first pipe downstream shall be bedded to established line and grade with the groove upstream. The

groove shall be carefully washed with a wet brush and the bottom half of the groove end buttered with mortar. A shallow excavation shall be made underneath the pipe at the joint, and this space shall be filled with mortar into which the ends of the first and second pipe bed when laid. The tongue of the next section of pipe shall be cleaned with a wet brush and a layer of mortar applied to the top half of it. The tongue end of the second pipe shall then be fitted into the groove end of the first pipe until the mortar is squeezed out onto the inner and outer surfaces. The inner surface of the pipe at the joint shall then be brushed smooth with a long handled brush and the outside pointed up with a bead of mortar.

52.9 Method of Measurement. Change to read as follows:

The length of pipe culverts to be paid for shall be the actual number of linear feet of culvert in place, but this length shall not be greater than shown on the plans or specified by the engineer. No allowances shall be made for cut-offs on a skew when the pipe is ordered mitered at the factory. When skew cut-offs are ordered in the field, full allowance shall be made for necessary lengths of pipe cut off due to skew.

Structural plate culvert pipe shall be measured as follows:

Pipes with square and vertical ends, end to end of metal, on center line of structure.

Pipes with skewed and vertical ends, end to end, on center line.

Pipes with square ends, beveled, average end to end at top and bottom of pipe, parallel to center line.

No allowances shall be made for overlaps when lighter gage sections are jointed to heavier gage sections to form one continuous culvert.

52.10 Basis of Payment. Change to read as follows:

This item, measured as provided above, shall be paid for at the contract unit price per linear foot for "_____inch Corrugated Metal Pipe," "_____inch by_____inch Corrugated Metal Arch Pipe," "_____inch Structural Plate Pipe (number of plates and gage)," "_____inch Vitrified Pipe," "_____inch Reinforced Concrete Pipe," "_____inch Plain Concrete Pipe," or "_____inch Corrugated Metal Siphon Pipe," as the case may be, which price shall be full compensation for all labor, materials, tools, supplies, equipment, and incidentals necessary to complete the culvert in accordance with the plans and these specifications, including band couplings or other devices to connect additional lengths to existing culverts.

Necessary excavation shall be measured and paid for as provided under "Structure Excavation," Section 20, except that when embankments are ordered constructed prior to installation of culverts, no quantities shall be measured for payment outside required elevations above the pipe.

Backfill, including the amount necessary to replace excavation below the grade of the pipe when required due to the character of material encountered, shall be paid for as specified under "Backfill," Section 21.

SECTION 54 - UNDERDRAINS

54.2 Materials. Change to read as follows:

All materials shall conform to the requirements of Part III, Material Details. Specific reference to Part III are as follows:

Water- -Section 70
Gravel for Bedding and Backfill- - - - - - - - - - - -Section 77
Portland Cement- - - - - - - - - - - - - - - - - - - -Section 89
Perforated Corrugated Metal Pipe - - - - - - - - - - -Section 95
Drain Tile -Section 99

SECTION 63 - PRESERVATIVE TREATMENTS FOR TIMBER

63.1 Description. Change to read as follows:

This item shall consist of the treatment of Douglas fir timber when required with creosote, creosote petroleum solution, creosote-coal tar solution, Wolman Salts (Tanalith), or Ammoniacal Copper Arsenite (Chemonite) in conformity with these specifications.

63.8 Quantity of Preservative. Change to read as follows:

The net retention in any charge shall be not less than ninety (90) per cent of the quantity of preservative that may be specified; but the average retention by the material treated under any contract or order and the average retention of any five (5) consecutive charges shall be at least one hundred (100) per cent of the quantity specified. Unless otherwise prescribed in the special provisions or on the plans, the minimum amount of preservative retained shall be as follows:

(a) Creosote, Creosote-Coal Tar Solution, or Creosote Petroleum solution Treatment.

For piles and timber in general bridge construction:

Full-cell process, not less than twelve (12) pounds of oil per cubic foot of timber treated, or
Empty-cell process, not less than ten (10) pounds of oil per cubic foot of timber treated.

(b) Salt Treatments.

For guard rail posts, culvert markers, guide posts and timber in general road construction:

Wolman Salts (Tanalith) not less then three-tenths (0.30) pounds per cubic foot of timber treated, or
Ammoniacal Copper Arsenite (Chemonite) not less than three-tenths (0.30) pounds per cubic foot of timber treated.

63.9 Pressure Treatments for Douglas Fir. Add the following new provision:

(c) Wolman Salts Treatment (Tanalith). The treating solution shall generally have a strength of concentration in water of one and eight tenths (1.8) percent to two (2) percent of Wolman Salts in ninety-eight and two tenths (98.2) percent to ninety-eight (98) percent of water, but the solution shall be no stronger than necessary to obtain the required retention of preservative specified below with the greatest volumetric absorbtion applicable.

Before treatment, all timber and lumber shall be air seasoned or kiln dried until the moisture content is below twenty (20) percent. Timber containing more than twenty (20) percent moisture shall be classed as green timber and shall be given an artificial seasoning in an air tight retort by a bath of live steam at from ten (10) to fifteen (15) pounds per square inch pressure for a period of from four (4) to ten (10) hours followed by a vacuum of at least twenty (20) inches for one (1) hour or with alternating periods of vacuum and pressure as may be found necessary to put the timber into condition for treatment. The cylinder shall be relieved continuously or frequenty enough to prevent condensate from accumulating in sufficient quantity to reach the wood. Air seasoned or kiln dried timber shall be placed in a vacuum of not less than twenty (20) inches for a period of at least fifteen (15) minutes. If the vacuum is broken while the condensate is being drained from the cylinder, a second vacuum as high as the first shall be created.

After the seasoning process specified above is completed, the preservative solution maintained at a temperature of between one hundred twenty (120) degrees and one hundred eighty(180) degrees F. shall be admitted into the treating cylinder without breaking the vacuum until the timber is completely submerged. The preservative solution shall then be pumped into the timber under pressure sufficient to secure the desired absorption, or if this can not be obtained, then under a pressure of one hundred and fifty (150) pounds per square inch continuing until the charge is treated to refusal. The refusal pressure shall be considered as one hundred and seventy five (175) pounds per square inch. The solution shall then be quickly drained off and the timber may be left in the cylinder to drip for approximately thirty (30) minutes or a quick vacuum at no time greater than the minimum vacuum during the submergency may be created and maintained until the charge can be removed from the cylinder free from dripping preservatives; or preferably a final air pressure of fifty (50) pounds for fifteen (15) minutes and then seventy five (75) pounds for fifteen (15) minutes may be applied.

The amount of solution injected into the timber and the strength of concentration must be so controlled as to leave not less than three tenths (0.30) pounds of dry salt for each cubic foot of timber treated, and this shall permeate all the sap-wood and as much of the heart wood as is practicable.

Penetration shall be determined by sampling each charge as may be desired. Any holes which may be bored shall be filled with tight fitting treated plugs.

All timber and lumber treated by this process shall be seasoned after treatment by kiln drying or air drying in the same manner as outlined in paragraph (e).

(d) Ammoniacal Copper Arsenite (Chemonite) Treatment. All timber and lumber after seasoning to a moisture content of not less than twenty (20) percent shall be given a steam bath for at least one (1) hour at a temperature of not over two

hundred and twelve (212) degrees. Green timber and lumber or any timber and lumber of more than twenty (20) percent moisture content shall be steamed for at least three (3) hours or until the moisture content is less than twenty (20) percent.

After the seasoning process, specified above, has been completed, a vacuum of at least twenty-four (24) inches shall be drawn for a period of at least one (1) hour. The collected water of condensation shall then be drawn off without relieving the vacuum. Without breaking vacuum the solution shall then be introduced at is ordinary storage tank temperature, pumped in until the tank is full and the entrapped air drawn off. Pressure shall be brought up slowly to one hundred and forty to one hundred and fifty (140 to 150) pounds per square inch and held until sufficient solution has been absorbed to give three tenths (0.30) pounds of the toxic salts per cubic foot of wood in the retort. The remaining liquor shall then be drained off and forty to fifty (40 to 50) pounds per square inch of air pressure applied for thirty (30) minutes to prevent excessive drippings.

Timber and lumber treated with Chemonite shall show average depths of penetration of the chemical compound equal to those shown in the following table for the various sizes of material and a minimum depth of penetration of at least ninety (90) percent of the averages shown:

Size in inches	Average depth of penetration
2 x 12	3/8 inch
3 x 12	7/16 inch
4 x 12	1/2 inch
8 x 10	9/16 inch
10 x 12	5/8 inch
12 x 12	3/4 inch

For intermediate sizes the depth of penetration shall be in proportion to those shown above.

(e) Seasoning Process after Wolman Salts or Chemonite Treatment. All timber and lumber after treatment with Wolman Salts or Chemonite shall be seasoned by kiln drying or air drying under cover before being erected into the structure, after seasoning, the average moisture content of material, six (6) inches or more in thickness shall not exceed eighteen (18) percent for the outside one and one half ($1\frac{1}{2}$) inch zone and the average moisture content of material less than six (6) inches in thickness shall not exceed eighteen (18) percent for the outside one (1) inch zone.

The moisture content shall be determined by the "oven drying" method from samples collected by inclement cores or borings to the depth of the zone prescribed above for the two size classes of material. Samples shall be taken from the centers of the wide faces midway between the ends of the pieces and sufficient pieces shall be sampled to provide a truly representive test. All cores shall be combined into one composite sample if the material is all in one size class or into two samples if both size classes are represented. A moisture content as determined by these samples shall be considered the moisture content of the lot of material tested.

Material having a moisture content in excess of eighteen (18) percent shall be subjected to further seasoning before its use is permitted. All timber and lumber seasoned under this specification shall be subject to the grading rules pertaining to checks after undergoing the seasoning process.

All holes bored for sampling timber and lumber to determine the moisture content after seasoning shall be filled with tight fitting treated and seasoned plugs.

SECTION 64 - GUARD RAIL

Change entire Specification to read:

64.1 Description. This item shall consist of furnishing and delivering all necessary posts, steel plate beams, supports, fastenings and fittings, and preparing, assembling, setting and erecting the same; the preservative treatment, and painting of pertinent parts as required by these specifications and shown on the plans, for a completed guard rail of the type, at the locations, and to the lines and grades shown on the plans or ordered by the engineer. Where so required by the plans and proposal or ordered by the engineer, the work done under this item shall also consist of the careful dismantling, removal and re-erecting or storing (at locations specified on the project) of existing guard rail. This item shall also include the furnishing and erecting of timber curb when so required by the plans, erected in accordance with the plans and these specifications and at locations shown or otherwise ordered.

64.2 Materials. The materials used shall be those prescribed for the several items which constitute the finished work and shall conform with all the requirements for such materials as set out in this specification and in Part III, "Material Details."

Specific reference to Part III is as follows:

Treated Douglas fir (coast region) guard rail posts (1200#c, No. 1 Posts and Timbers).....Section 100

Redwood guard rail posts (1100#c Heart Structural posts and timbers).....Section 100

Port Orford cedar guard rail posts (1100#c Posts and Timbers).....Section 100

Treated Douglas fir (coast region) curb (1100#f No. 2 joists and plank).....Section 100

Timber Preservatives.....Section 102

Guard Rail Materials.....Section 104

Paints and paint materials.....Section 106

64.3 Construction Details. Unless otherwise specified, guard rail may be constructed with either Redwood, Port Orford cedar, or treated Douglas fir posts, beam type plates, and fittings, as shown on the plans. Douglas fir posts shall be given a preservative treatment of Wolman Salts or Chemonite, as prescribed in Section 63. Post spacing shall be as shown on the plans.

Posts shall be set plumb, except on superelevated curves where they shall be set perpendicular to the roadbed. Front faces of posts shall form a straight line, except on curves where they shall be a uniform distance from the center line of the roadway. Post holes shall be backfilled in layers with approved material thoroughly rammed with an iron tamping tool in such manner as not to displace the bottoms of posts from correct alignment. All surfaces of the posts in contact with fittings shall receive one coat of the prescribed paint before the fittings are placed.

The rail shall be erected in the manner shown on the plans. Workmanship shall be first class in all respects and framing shall be done and fittings attached in such manner that the rail, after erection, shall be true to line and grade and shall have the proper tension in the rail plates. Care shall be taken to prevent the disturbance of posts during the erection of the rail, and, when necessary, temporary braces shall be installed to insure against post displacement.

Beam type rails shall be erected so that the bolts at expansion joints are located at the centers of the slotted holes.

After erection, posts and all metal parts and fittings, free from coatings of any kind including dirt, rust, and oil or grease, shall be given three coats of paint as specified in Section 66, except that the prescribed priming coat shall be omitted on all metal parts and fittings, which have been either galvanized, or shop prime coated by the manufacturer. Galvanized parts, prior to applying paint, shall be slightly etched with a solution composed of one quart of vinegar to two gallons of water. The surface shall be rinsed with clear water and allowed to dry thoroughly before painting. Prime coat applied by the manufacturer shall be carefully handled to prevent scratching and marring and all such scratches or mars shall be spotted prior to application of specified paint.

After the rail has been painted as specified, nuts fastening rail plate to springs shall be backed off slightly so that the connection is firm but not tight and will permit the slight movement necessary to absorb expansion and contraction of the rail.

Unless otherwise required by the plans, rebuilt units of guard rail shall be of the same type, spacing of members, etc., as original guard rail.

All salvable materials shall be removed and re-erected (or stored if so specified) with reasonable care. Posts, rails, and incidental hardware for re-erecting rail shall, in all cases, be obtained from salvage sources, but the contractor shall furnish such additional bolts, supports or incidental hardware as may be necessary to complete the guard rail.

When removal and storage is specified, the bolts, supports and other hardware shall be removed from all rails and posts and all parts shall be sorted and stored at the locations specified. Rail and posts shall be properly stacked and miscellaneous hardware shall be sacked or boxed and all such reasonable care exercised in the handling, storage and preservation of materials as will insure the maximum salvage value for the entire operation.

All guard rail removed and re-erected shall be painted with one coat of paint (Section 66 "Painting") after first touching up all spots on which the original paint has been removed or destroyed.

The timber curb shall be constructed as shown on the plans after the guard rail has been erected. Splices shall be made at posts.

On each length of timber curb an application of asphalt mastic shall be applied by a trowel or other suitable means, to the edge contacting the roadway surface and shall be applied in such a manner and in sufficient amounts to secure a positive seal between the timber curb and the surface. The joint facing centerline of the roadway between the timber curb and the surface shall be struck with a suitable tool to produce a finished appearance and in areas where surfacing irregularities will not permit a full, uniform joint between the curb and the surfacing material, additional mastic shall be applied at the joint on each side of the curb and forced into the joint to form a full, tight, uniform seal.

Asphalt mastic used on timber curb shall be Flintkote Mastic No. 232, manufactured by Flintkote Company or an approved equal. Timber curb shall be treated with Chemonite or Wolman Salts.

64.4 Method of Measurement. The quantity of new guard rail or re-erected guard rail to be paid for shall be the number of linear feet of rail, complete in place and accepted, measured along the front face of the rail between centers of end posts.

When the plans require that guard rail is to be removed and stored, the amount of guard rail to be paid for shall be the actual number of linear feet of guard rail (measured center to center of end posts in its original position) dismantled, sorted as to members and material, and properly stacked and stored at the locations specified; provided, however, that the above number of linear feet may be reduced in proportion to the amount of unsalvable material produced in the dismantling and storing of materials.

The quantity of timber curb to be paid for shall be the number of linear feet of timber curb, complete in place and accepted, measured along its front face between the outside edges of end posts, excluding therefrom the lengths of all openings.

64.5 Basis of Payment. The footage measured as provided above shall be paid for at the contract unit price bid:

Per linear foot for "Beam Type Guard Rail, Type A" or "Beam Type Guard Rail, Type B", as the case may be, which payment shall be full compensation for furnishing, preparing, placing and erecting all materials, treating posts, inspection certificates, excavating and backfilling, painting, and for all labor, materials, tools, supplies, equipment and incidentals necessary to complete the work;

Per linear foot for "Remove and Reset Guard Rail" which payment shall be full compensation for dismantling, removing and re-erecting at locations specified and for all labor, tools, supplies, equipment and incidentals necessary to complete the work;

Per linear foot for "Remove Guard Rail" which payment shall be full compensation for dismantling, removing, handling and storing at locations specified and for all labor, tools, supplies, equipment and incidentals necessary to complete the work, provided however, that the quantitites to be paid for may be reduced as provided above for producing unsalvable material in dismantling and storing;

Per linear foot for "Timber Curb" which payment shall be full compensation for furnishing, preparing and erecting the timber curb, furnishing and applying asphalt mastic and for all labor, materials, tools, supplies, equipment and incidentals necessary to complete the work.

SECTION 65 - CULVERT MARKERS AND GUIDE POSTS

Change entire Specification to read:

65.1 Description. This item shall consist of furnishing all materials and erecting timber culvert markers or guide posts, conforming to the details and dimensions shown on the plans, these specifications, and at points indicated on the plans or ordered by the engineer.

65.2 Species. Timber for posts shall be select merchantable plank of the following species: Port Orford Cedar, Redwood, or Douglas Fir (Coast Region).

Douglas Fir shall be given a preservative treatment of Chemonite or Wolman Salts in accordance with Section 63.

The standard stress grade shall be 1100#f, Joist and Plank, S 4 S.

65.3 Materials. The materials used shall be those prescribed for the several items which constitute the finished work and shall conform to all the requirements for such materials as set forth in Part III, "Material Details." Specific reference to Part III are as follows:

Timber- Section 100
Timber Preservative - - - - - - - - - - - - - - - Section 102
Paints and Paint Materials- - - - - - - - - - - - Section 106

Reflectorized Material shall be Minnesota Mining and Manufacturing Company "Scotchlite"or an approved equal.

65.4 Construction Methods. The culvert markers and guide posts shall be painted with the colors and as indicated on the plans and shall be given three (3) coats of standard paint for wood and timber, conforming to the provisions of Section 106.

The wood shall be dry and clean and the painting shall be done in accordance with the applicable provisions of Section 66 "Painting."

Posts treated by the Salt Treatments process shall be dried to a moisture content which will not interfere with the application and retention of paint.

All exposed surfaces of the markers or guide posts that have become soiled or damaged before acceptance of the contract shall be cleaned, repainted, or replaced at the contractor's expense and no compensation will be allowed for such work.

The contractor shall furnish the engineer two (2) copies of inspection certificates, which shall certify that the timber, preservative treatment if required, paint, reflectorizing material, and number of coats of paint comply with these specifications.

The markers and guide posts shall be spaced and erected in the manner indicated on the plans, and shall be set plumb, except on superelevated curves they shall be set perpendicular to the roadbed.

After the markers and posts are placed, the holes shall be backfilled with approved material, thoroughly rammed in place with an iron tamping tool in such a manner as not to shift the posts or markers from their correct position or alignment.

Reflectorized material shall be applied to the markers and post as shown on the plans after erection. The reflectorized material shall be firmly attached to the posts by means of an approved adhesive designed for this purpose.

When the proposal calls for existing culvert markers and guide posts to be removed and reset, the posts in place shall be carefully removed, stockpiled if necessary, and reset at specified locations. Resetting and painting shall be as specified above.

Unless otherwise noted on the plans, guide posts shall be set according to the following data:

(1) On both sides of the roadbed at the beginning and end of each curve, at five hundred (500) foot intervals on tangents, and at four hundred (400) foot intervals on curves having a radius greater than five thousand (5000) feet.

(2) On the inside of curves at five hundred (500) foot intervals up to five thousand (5000) feet radius.

(3) On the outside of curves, the intervals between posts shall be as follows:

Radius 500'	or less	-	50'
550'	to 1000'	-	75'
1050'	to 2500'	-	100'
2550'	to 5000'	-	200'

(4) Six guide posts shall be set to outline Type 1 Approaches and two shall be set at Type 2 Approaches.

All spacing shown above is approximate only. Posts shall be set as directed by the engineer.

No guide posts will be required on tangents where the spacing between culvert markers is less than 750', or in cuts having backslopes steeper than 4:1.

65.5 Method of Measurement and Basis of Payment. The number of culvert markers and guide posts complete in place and accepted shall be paid for at the contract unit price bid each "Culvert Markers and Guide Posts" which payment shall be full compensation for furnishing, painting, hauling, and erecting the posts, disposal of surplus material, for preservative treatment if required, for inspection certificates, and for all labor, material, tools, supplies, equipment, and incidentals necessary to complete the work, including excavation and backfill.

When called for, the number of culvert markers and guide posts removed and reset, complete in place and accepted shall be paid for at the contract unit price bid each for "Remove and Reset Culvert Markers and Guide Posts," which payment shall be full compensation for removing the posts, stockpiling if necessary, painting and resetting them in accordance with this specification, and for all labor, equipment, materials, supplies, tools and incidentals necessary to complete the work specified, including excavation, backfill and disposal of surplus materials.

SECTION 66 - PAINTING

66.2 Materials. Change to read as follows:

All paints and paint materials shall be of the quality specified in Part III, "Material Details" for each item and for the mixed paints. Small quantities of paint will be accepted upon written guarantee of the manufacturer, subject to check tests hereinafter specified. Such guarantee shall be furnished in triplicate to the engineer and shall show the analysis of the paint in sufficient detail to indicate that it meets all of the requirements of the specifications. The paint shall not be used until approved by the engineer. The Department reserves the right to sample all shipments of paint, either at destination or point of origin, and to withhold acceptance of the paint until analysis of such samples. Failure of such samples to meet all the requirements of the specification will be cause for rejection of the paint represented, and the withdrawal of the acceptance of paint upon the written guarantee of the manufacturer. Specific reference to Part III is as follows:

Paint and paint materials- - - - - - - - - - - - Section 106

66.3 Number of Coats. Change to read as follows:

Unless otherwise required on the plans or in the special provisions, the number of and kinds of coats of paint shall be as follows:

Structural Steel and Metal Parts:

* First Coat.	Approved Red Lead Primer
Second and Third Coats.	Approved White Lead, White Lead-Zinc Oxide, or Titanium Oxide Outside White Paint.

* Note - Metal Guard Rail elements and hardware may be primed with an approved Zinc Chromate Primer.

Wood and Timber:

First Coat.	Approved White Lead, White Lead-Zinc Oxide, or Titanium Oxide Primer.
Second and Third Coats	Approved White Lead, White Lead-Zinc Oxide, or Titanium Oxide Outside White Paint.

The second coat shall be tinted with lamp black to a light gray color.

SECTION 67 - FENCING

67.3 Construction Methods. Change the last two paragraphs to read:

Unless otherwise specified fences which are the property of the Department shall be placed in such a position that the posts are in the right of way and the wire, pickets or board rails are set directly on the right of way lines.

Unless otherwise specified fences which are the property of abutting land owners shall be placed with the posts on the owners property immediately outside the right of way.

67.4 Method of Measurement. Add the following:

When "Missouri Gates" are indicated on the plans to be installed they shall be measured as linear feet of fence. No measurement shall be made as gates.

67.5 Basis of payment. Add the following:

"Missouri Gates" shall be paid for as linear feet of fence. No payment shall be made as gates.

SECTION 68 - Change the entire specification to read:

SECTION 68 - REFERENCE MONUMENTS

68.1 Description. This item shall consist of constructing Portland cement concrete monuments of the design and at the locations indicated on the plans or directed by the engineer.

68.2 Materials. All materials shall conform to the requirements of Part III, "Material Details". Specific reference to Part III are as follows:

Water.	Section 70
Coarse aggregate for Portland cement concrete.	Section 76
Fine aggregate for Portland cement concrete.	Section 81
Portland cement.	Section 89

Bronze disks will be furnished by the Department.

68.3 Construction Methods. Monuments shall be constructed of Portland Cement Concrete, in accordance with the applicable provisions of Section 45, "Concrete Structures." The class of cement concrete to be used shall be as shown on the plans or set forth in the Special Provisions.

These monuments shall be set to assist in reestablishment of the centerline for future use and shall be set at the beginning and end of each project, at the beginning and end of each curve, and approximately 1/2 mile apart on long tangents.

These monuments located as outlined above, shall be established outside construction limits, and the exact location will be that determined by the engineer.

A hole just large enough for the monument shall be excavated for the required depth. If solid rock is reached before the required depth is reached the monument may be built on this instead of being built to its full depth. This hole shall be filled with the cement concrete. When the concrete has set sufficiently the bronze disk or a plug shall be installed in the exact position required by the engineer.

68.4 Method of Measurement and Basis of Payment. This work shall be paid for at the contract unit price each for "Reference Monuments" complete in place, which price shall be full compensation for all labor, materials, tools, supplies, equipment, and incidentals necessary to complete the work, including excavation, backfill, and disposal of surplus excavated material.

PART III

MATERIAL DETAILS

SECTION 74 - CRUSHED ROCK AND SCREENINGS FOR ROAD TREATMENT WITH BITUMINOUS MATERIALS

74.6 Size Requirements, Screenings for Bituminous Surface Treatment. Change to read as follows:

The aggregate shall conform to one of the following sieve analysis, as specified.

Laboratory Sieve Square Openings	Percentage by Weight Passing Sieve	
	1/2 inch size	3/8 inch size
1/2 inch	100	--
3/8 inch	75-90	100
No. 4	8-30	30-60
No. 10	0-8	0-8
No. 200	0-2	0-2

SECTION 84 - LIQUID ASPHALT

84.2 Test Reports, Shipping Notice and Preliminary Sample. Change to read as follows:

(a) Contractors, vendors, and manufacturers responsibility. At the time of contract award, the contractor shall furnish to the department the name and address of the vendor and/or the manufacturer furnishing the liquid asphalt proposed for use on the project.

If so required by the engineer, the manufacturer shall ship by prepaid express a representative sample of each classification and grade of liquid asphalt proposed for use on the project for testing by the department, and department approval must be obtained prior to ordering shipment.

The vendor of material shall cooperate with representatives of the department in obtaining samples for department testing.

The vendor of the liquid asphalt shall provide a letter of guarantee to the engineer and the contractor stating that each car or truck transport load of material shipped to the project will meet the requirements of these specifications, and that he (the vendor) assumes full responsibility for any dilutents or contaminants, remaining as residue from previous loadings of cars or truck tankers which change the qualtity of the material delivered to the project. Liquid asphalt shipped in cars or truck tankers containing residue from previous loadings in the form of dilutents or contaminants will not be paid for at the invoice quantity but will be rejected or otherwise assessed damages based upon the effects of the dilution or contamination.

(b) Shipping Notice. The Division Engineer of the division to which shipment is made shall be notified immediately, by wire, (teletype or telegraph) upon making shipment and confirming shipping notices shall be mailed immediately thereafter. One copy of the shipping notice shall be mailed to the State Highway Engineer at Carson City, Nevada and two copies shall be mailed to the Division Engineer of the Division to which shipment is made.

The notice by wire shall contain the following data:

1. Consignee & Destination
2. State Contract Number (or State Purchase Order Number, if applicable)
3. Date shipped
4. Net Quantity
5. Car Intials and number or truck transport delivery ticket number
6. Type and grade of material

The mailed notice shall contain the following data:

1. Consignee & Destination
2. State Contract Number (or State Purchase Order Number, if applicable)
3. Delivery point
4. Date shipped
5. Car initial and number or truck transport delivery ticket number
6. Type and grade of material
7. Quantity loaded
8. Loading temperature
9. Net quantity
10. Signature of shipper or authorized representative

(c) Refinery Test Reports. Refinery test reports shall be mailed to the State Highway Engineer, Carson City, Nevada as soon as tests have been completed, and the reports shall contain the following data:

1. Date of Shipment
2. Car Initials and number or truck transport delivery ticket number

3. Destination and Consignee
4. State Contract Number (or State Purchase Order Number, if applicable)
5. Type and grade of material
6. Certificate of grade (certify that material conforms to these specifications, and itemize results on tests performed)
7. Signature of refinery's authorized representative

SECTION 85 - EMULSIFIED ASPHALT

Change entire specification to read:

85.1 Material Covered. This specification covers the quality of emulsified asphalts. Emulsified asphalt as designated herein shall be composed of an intimate homogeneous mixture of base asphalt and an emulsifying agent held in suspension in water.

85.2 General Requirements. (a) Contractors, vendors, and manufacturers responsibility. At the time of contract award, the contractor shall furnish to the department the name and address of the vendor and/or the manufacturer furnishing the emulsified asphalt proposed for use on the project.

If so required by the engineer, the manufacturer shall ship by prepaid express a representative sample of each classification and grade of emulsified asphalt proposed for use on the project for testing by the department, and department approval must be obtained prior to ordering shipment.

The vendor of material shall cooperate with representatives of the department in obtaining samples for department testing.

The vendor of the emulsified asphalt shall provide a letter of guarantee to the engineer and the contractor stating that each car or truck transport load of material shipped to the project will meet the requirements of these specifications and that he (the vendor) assumes full responsibility for any dilutents or contaminants, remaining as residue from previous loadings of cars or truck tankers which change the quality of the material delivered to the project. Emulsified asphalts shipped in cars or truck tankers containing residue from previous loadings in the form of dilutents or contaminants will not be paid for at the invoice quantity but will be rejected or otherwise assessed damages based upon the effects of the dilution or contamination.

(b) Shipping Notice. The Division Engineer of the Division to which shipment is made shall be notified immediately, by wire (teletype or telegraph) upon making shipment and confirming shipping notices shall be mailed immediately thereafter. One copy of the shipping notice shall be mailed to the State Highway Engineer at Carson City, Nevada and two copies shall be mailed to the Division Engineer of the Division to which shipment is made.

The notice by wire shall contain the following data:

1. Consignee & Destination
2. State Contract Number (or State Purchase Order Number, if applicable)
3. Date shipped
4. Net Quantity

5. Car Intials and number or truck transport delivery ticket number
6. Type and grade of material

The mailed notice shall contain the following data:

1. Consignee and Destination
2. State Contract Number (or State Purchase Order Number, if applicable)
3. Delivery point
4. Date shipped
5. Car Initial and number or truck transport delivery ticket number
6. Type and grade of material
7. Quantity loaded
8. Loading temperature
9. Net quantity
10. Signature of shipper or authorized representative

(c) Refinery Test Reports. Refinery test reports shall be mailed to the State Highway Engineer, Carson City, Nevada as soon as tests have been completed, and the reports shall contain the following data:

1. Date of shipment
2. Car initials and number or truck transport delivery ticket number
3. Destination and consignee
4. State Contract Number (or State Purchase Order Number if applicable)
5. Type and grade of material
6. Certificate of grade (certify that material conforms to these specifications, and itemize results on tests performed)
7. Signature of refinery's authorized representative

85.3 Specific Requirements. (a) Emulsified Asphalt, Type RS1. This emulsion is a quick breaking type, intended to be used where a relatively low viscosity and asphalt content is desired. Its principal uses are in penetration work and seal coating, and shall contain an asphalt base of one of the following, as specified:

(1) Liquid Asphalt, Type SC-6, conforming to Section 84, of these Specifications.

(2) Asphalt Cement, 150 to 200 penetration conforming to Section 86, of these Specifications.

(b) Emulsified Asphalt, Type RS-2. This emulsion is a quick breaking, high viscosity, relatively high asphalt content type, intended to be used for surface treatment and sealing. It shall be of a consistency suitable for application through a pressure distributor heated to a temperature of one hundred and twenty (120) to one hundred and fifty (150) ° F. and shall contain an asphalt base of one of the following, as specified:

(1) Liquid Asphalt, Type SC-6, conforming to Section 84, of these Specifications.

(2) Asphalt Cement, 150 to 200 penetration conforming to Section 86, of these specifications.

(c) Emulsified asphalt, Type MS-1. This emulsion is a medium breaking, low consistency asphalt intended for use in mixes and shall contain an asphalt base of one of the following, as specified:

(1) Liquid Asphalt, Type SC-6, conforming to Section 84, of these Specifications.

(2) Asphalt Cement, 70 to 85 penetration or 150 to 200 penetration conforming to Section 86, of these Specifications.

Emulsified asphalt shall conform to the requirements of Table I for the type and grade specified when tested in accordance with A.A.S.H.O. as is enumerated.

85.4 Sampling and Testing. Sampling and testing of emulsified asphalt shall be in accordance with the following methods:

Viscosity	A.A.S.H.O. T-59
Screen Test	A.A.S.H.O. T-59
Demulsibility	A.A.S.H.O. T-59
Settlement in 5 Days	A.A.S.H.O. T-59.
Miscibility	A.A.S.H.O. T-59
Coating Test	A.A.S.H.O. T-59
Residue at 325° F.	Nevada Section 6
Sampling	A.A.S.H.O. T-40

NOTE - Emulsified asphalt samples shall be shipped in clean glass or black iron containers.

TABLE I - REQUIREMENTS FOR EMULSIFIED ASPHALT

CLASS	QUICK SETTING		MEDIUM SETTING
TYPE	RS-1	RS-2	MS-1
Viscosity, Saybolt Furol at 77° F., Sec.	20-55	—	20-55
at 122° F., Sec.	—	100-400	—
Residue by distillation at 325° F., %	55 min.	55 min.	55 min.
Settlement, 5 days, 7%	3 min.	3 min.	5 min.
* Demulsibility, 50 ml of 0.1N, $CaCl_2$ %	—	—	30 max.
* Demulsibility, 35 ml of 0.02N, $CaCl_2$ %	60 min.	45-100	—
Sieve Test, %	0.10 max.	0.10 max.	0.10 max.
Miscibility with water	—	—	a
Coating Test	—	—	b

* The demulsibility test shall be made within 30 days after shipment

a - No coagulation in two (2) hours

b - No appreciable separation in three (3) minutes

SECTION 86 - ASPHALT CEMENT

Change entire specification to read:

86.1 Material Covered. This specification covers the quality of asphalt cement prepared from petroleum for use in bituminous mixes.

86.2 General Requirements. (a) Contractors, vendors, and manufacturers responsibility. At the time of contract award, the contractor shall furnish to the department the name and address of the vendor and/or the manufacturer furnishing the asphalt cement proposed for use on the project.

If so required by the engineer, the manufacturer shall ship by prepaid express a representative sample of each classification and grade of asphalt cement proposed for use on the project for testing by the department, and department approval must be obtained prior to ordering shipment.

The vendor of material shall cooperate with representatives of the department in obtaining samples for department testing.

The vendor of the asphalt cement shall provide a letter of guarantee to the engineer and the contractor stating that each car or truck transport load of material shipped to the project will meet the requirements of these specifications, and that he (the vendor) assumes full responsibility for any dilutents or contaminants, remaining as residue from previous loadings of cars or truck tankers which change the quality of the material delivered to the project. Asphalt cement shipped in cars or truck tankers containing residue from previous loadings in the form of dilutents or contaminants will not be paid for at the invoice quantity but will be rejected or otherwise assessed damages based upon the effects of the dilution or contamination.

(b) Shipping Notice. The division engineer of the division to which shipment is made shall be notified immediately, by wire, (teletype or telegraph) upon making shipment and confirming shipping notices shall be mailed immediately thereafter. One copy of the shipping notice shall be mailed to the State Highway Engineer at Carson City, Nevada and two copies shall be mailed to the Division Engineer of the division to which shipment is made.

The notice by wire shall contain the following data:

1. Consignee & Destination
2. State Contract Number (or State Purchase Order Number, if applicable)
3. Date Shipped
4. Net Quantity
5. Car Initials and number or truck transport delivery ticket number
6. Type and grade of material

The mailed notice shall contain the following data:

1. Consignee & Destination
2. State Contract Number (or State Purchase Order Number, if applicable).

3. Delivery point
4. Date shipped
5. Car initial and number or truck transport delivery ticket number
6. Type and grade of material
7. Quantity loaded
8. Loading temperature
9. Net quantity
10. Signature of shipper or authorized representative

(c) Refinery Test Reports. Refinery test reports shall be mailed to the State Highway Engineer, Carson City, Nevada as soon as tests have been completed, and the reports shall contain the following data:

1. Date of Shipment
2. Car initial and Number or truck transport delivery ticket number
3. Destination and Consignee
4. State Contract Number (or State Purchase Order Number if applicable)
5. Type and grade of material
6. Certificate of grade (certify that material conforms to these specifications, and itemize results on tests performed).
7. Signature of refinery's authorized representative

86.3 Specific Requirements. Asphalt cement shall be prepared by the distillation of crude petroleum. The asphalt shall be homogeneous, free from water, and shall not foam when heated to 347° F.

These specifications cover the following penetration grades:

40 - 50
50 - 60
60 - 70
70 - 85
85 - 100
100 - 120
120 - 150
150 - 200
200 - 300

The various penetration grades set forth above shall conform to the requirements shown in Table I.

86.4 Sampling and Testing. Sampling and testing shall conform to the following requirements:

TEST	A.A.S.H.O. TEST METHODS
Sampling	-T-40
Water	-T-55
Penetration	-T-49
Solubility - Method No. 1 except cp CCl_4 substituted for CS_2	-T-44
Ductility	-T-51

Flash Point- -T-48
Loss on Heating- - - - - - - - - - - - - - - - - - -T-47
Inorganic Matter (Ash) - - - - - - - - - - - - - - -T-111
Spot Test- -T-102

TABLE I

REQUIREMENTS FOR ASPHALT CEMENT ROAD MATERIALS

TESTS	A.A.S.H.O. TEST METHODS	PENETRATION GRADES			
		40 - 120	120 - 150	150 - 200	200 - 300
Penetration of original sample 77° F. 100 gms., 5 sec. Pen. Grade as specified	T-49	40-50 50-60 60-70 70-85 85-100 100-120	120-150	150-200	200-300
Flash Point (cl.op. cup) min. °F.	T-48	425	400	400	350
Loss on Heating, 325° F., 5 hrs. max. %	T-47	1.0	1.0	1.0	1.0
DUCTILITY 77° F., 5 cm/minute, min. cm	T-51	100	100	---	---
Penetration of residue after heating % of original, min.	T-49	80.0	70.0	70.0	65.0
Solubility in CCl_4, % min.	T-44	99.0	99.0	99.0	99.0
Inorganic Matter (Ash) % max.	T-111	1.0	1.0	1.0	1.0
* SPOT TEST: (When specified)	T-102				
Standard Naptha Solvent,		Neg.	Neg.	Neg.	Neg.
Naptha Xylene Solvent, _____% Xylene		Neg.	Neg.	Neg.	Neg.
Heptane Xylene Solvent, _____% Xylene		Neg.	Neg.	Neg.	Neg.

* NOTE: The use of the spot test is optional. When specified, the engineer shall indicate whether standard naphtha solvent, the naphtha-xylene solvent or the heptane-xylene solvent will be used in determining compliance with the requirement and also, in case of the xylene solvents, the percentage of xylene to be used.

SECTION 89 - PORTLAND CEMENT

Change entire specification to read:

89.1 Material Covered. The cements covered by these specifications are for five (5) types of Portland Cement as required under pertinent sections of these specifications.

89.2 Requirements. The cements shall meet the requirements as set out in the current "Standard Specification for Portland Cement," A.A.S.H.O. Designation: M 85.

Unless otherwise provided or called for in the Special Provisions, Type I cement shall be furnished when air-entraining agents as additives are not used and Type II "low-alkali cement" shall be used when air-entraining agents as additives are used.

89.3 Air-Entraining Agents. Air-Entraining agents used as additives, shall be solutions of materials recognized as acceptable additions to cement for these purposes as they appear in Section 45 "Concrete Structures." However, the engineer reserves the right to check at any time by laboratory tests and other means, the suitability of any of the materials so listed and to verify certification of the manufacturer, and the approval of the listed additives in the Special Provisions or herein shall be considered conditional only and contigent upon actual experience with the use of any specified material listed. Approval may be revoked at any time should it develop that unsatisfactory results of whatever nature are encountered with its use.

The solutions of air-entraining agents shall be added to the ingredients for the concrete in such proportions as to yield entrained air within the range prescribed in Section 45 - "Concrete Structures."

SECTION 90 - STRUCTURAL, RIVET, AND EYEBAR STEEL

Change entire specification to read:

90.1 General. These specifications cover structural steel for highway structures and other structural purposes. Unless otherwise specified, structural carbon steel and structural rivet steel shall be furnished.

90.2 Mill Test Reports. Two certified copies of the mill test report showing the chemical and physical characteristics of each heat from which metal is used shall be furnished by the contractor.

90.3 Requirements. (a) Structural Carbon Steel. Structural carbon steel shall conform to the requirements of the current "Specification for STEEL FOR BRIDGES AND BUILDINGS," A.S.T.M. Designation: A-7.

(b) Structural Rivet Steel. Structural rivet steel shall conform to the requirements of the current "Specification for STRUCTURAL RIVET STEEL," A.S.T.M. Designation: A-141.

(c) Structural Alloy Steel. Structural alloy steel shall conform to the requirements of the current "Specification for LOW-ALLOY STRUCTURAL STEEL," A.S.T.M. Designation: A-242.

(d) Defects. Finished rolled material shall be free from cracks, flaws, injurious seams, laps, blisters, ragged and imperfect edges, and other defects. It shall have a smooth, uniform finish, and shall be straightened in the mill before shipment.

Material shall be free from loose mill scale, rust pits, or other defects affecting its strength or durability.

The engineer reserves the right to reject material which he deems unsuitable for the purpose intended even though the material meets the requirements of the mill tolerances.

SECTION 92 - REINFORCEMENT

Change entire Specification to read:

92.1 Materials Covered. These specifications cover plain and deformed billet steel and rail steel bars, fabricated steel bar or rod mats or welded steel wire fabric for concrete reinforcement.

92.2 Bar Steel Reinforcement. (a) Bar steel reinforcement shall meet the requirements of the current "Standard Specification for Billet Steel Reinforcement" or "Rail Steel Reinforcement," A.A.S.H.O. Designations: M 31 or M 42, except the cold-twisted or hot-twisted bars will not be acceptable.

(b) Unless otherwise provided on the plans or in the Special Provisions, all bar steel reinforcement shall conform to the requirements of the current "Standard Specification for Minimum Requirements for the Deformations of Deformed Steel Bars for Concrete Reinforcement," A.A.S.H.O. Designation: M 137.

92.3 Fabricated Steel Bar or Rod Mats Reinforcement. Fabricated steel bar or rod mats for concrete reinforcement shall conform to the requirements of the current "Standard Specification for Fabricated Steel Bar or Rod Mats for Concrete Reinforcement," A.A.S.H.O. Designation: M 54.

92.4 Welded Steel Wire Fabric Reinforcement. Welded steel wire fabric shall conform to the requirements of the current "Standard Specifications for Welded Steel Wire Fabric for Concrete Reinforcement", A.A.S.H.O. Designation: M 55.

92.5 Structural Shapes. Structural shapes used as concrete reinforcement shall conform to the requirements for "Structural Steel" as provided in these specifications.

SECTION 94. Change entire specification to read:

SECTION 94 - CORRUGATED METAL CULVERT PIPE, SIPHONS AND PLATES FOR STRUCTURAL PLATE PIPE AND ARCHES

94.1 Material Covered. This specification covers corrugated galvanized sheet metal culvert pipe, siphon pipe and corrugated galvanized plates intended for use in the construction of culverts and drainage structures.

94.2 Requirements for Corrugated Metal Culvert Pipe. Corrugated metal pipe shall conform to the requirements of the current "Standard Specifications for Corrugated Metal Culvert Pipe," A.A.S.H.O. Designation: M 36.

94.3 Requirements for Corrugated Metal Culvert Pipe Siphons. The corrugated metal pipe shall conform to the requirements of the current "Standard Specifications for Corrugated Metal Culvert Pipe," A.A.S.H.O. Designation: M 36, with the following exceptions:

(a) Rivets on circumferential seams shall be placed on approximately two and one-half ($2\frac{1}{2}$) inch centers with a maximum spacing of three (3) inches.

(b) Circumferential and longitudinal seams on the outside of the pipe where sheets lap shall be soldered in a workmanlike manner. The solder shall be sweated into the joints using an acetylene torch properly regulated for the purpose. The use of soldering irons on factory seams shall not be permitted.

(c) Sections of siphon pipe shall be joined in the field by means of an approved watertight coupling. All connecting bands shall be circular with no flattened arcs.

(d) All sheets used in any one culvert shall be of the same brand and so far as practicable shall bear the same heat number and coding number.

(e) The engineer reserves the right to inspect and test the siphons after delivery on the work. Injurious defects revealed subsequent to the acceptance of the pipe at the manufacturer's plant will be cause for rejection.

94.4 Requirements for Plates for Structural Plate Pipe and Arches. Plates and bolts for structural plate pipe and arches shall conform to the current specifications for "Structural Plate Pipes and Arches," as set forth in Section 19, Division IV of the "Standard Specifications for Highway Bridges of the A.A.S.H.O." The gage of the plates shall be as required on the plans or in the Special Provisions.

94.5 Requirements for Corrugated Metal Culvert Arch Pipe. The requirements for base metal, spelter coating, riveting, sampling, testing, marking, corrugations, end finish and workmanship shall be as prescribed in the current "Standard Specifications for Corrugated Metal Culvert Pipe," A.A.S.H.O. Designation: M 36 with the following additions:

(a) Field joints shall be made with band couplers made to fit the deformed pipe.

(b) Dimensions, tolerances, areas, weights and gages shall be in accordance with the following table:

Band (Inches)	Rise (Inches)	Gage Pipe	Area Sq. Ft.	"T" (Inches)	"B" (Inches)	Gage Bands
18	11	14	1.1	6-1/2	4-1/2	16
22	13	14	1.6	8-1/4	4-3/4	16
29	18	12	2.8	12-1/2	5-1/2	14
36	22	12	4.4	15-3/4	6-1/4	14
43	27	10	6.4	20	7	12
50	31	10	8.7	23	8	12
58	36	10	11.4	26-3/4	9-1/4	12
65	40	10	14.3	29-1/2	10-1/2	12
72	44	8	17.6	32-1/4	11-3/4	10

All dimensions as shown in the above table are measured from the inside crests of the corrugations. A tolerance of plus or minus one (1) inch will be permissible in dimension "T" and dimension "B". The dimension "T" and "B" shall be measured vertically from the horizontal line drawn across the widest portion of the arch.

The dimension "T" is the distance from this horizontal line to the highest point of the intrados of the arch. The dimension "B" is the distance from this horizontal line to the lowest portion of the base. The minimum radius of curvature of any part of the arch section shall be four (4) inches.

The lapped longitudinal seams shall be factory riveted and shall be located in the arch above the base at sufficient distance to avoid riveted joints at points of curvature at the base.

94.6 Bituminous Coated Corrugated Metal Pipe. When so required or designated on the plans, or in the special provisions or proposal, pipe culverts and band couplings shall be coated with an approved asphaltic pipe dip at the plant before being shipped. The quality and character of the dip and the method of application shall be such that the coating on the pipe will be tough and pliable and adhere firmly to the spelter.

SECTION 95 - Change the entire Specification to read:

SECTION 95 - CORRUGATED METAL PIPE UNDERDRAINS

95.1 Material Covered. This specification covers the quality of perforated corrugated galvanized sheet metal pipe intended for use in the construction of underdrains.

95.2 Requirements. Perforated corrugated galvanized sheet metal pipe for underdrains shall conform to the requirements of the current "Standard Specifications for Corrugated Metal Pipe Underdrains," A.A.S.H.O. Designation: M 136.

SECTION 99 - Change entire Specification to read:

SECTION 99 - DRAIN TILE

99.1 Material Covered. These specifications cover drain tile for use as underdrains.

99.2 Classes. Unless otherwise provided on the plans or in the special provisions, the tile shall be "Extra Quality Drain Tile."

99.3 Requirements. Drain tile shall conform to the requirements of the current "Standard Specifications for Drain Tile", A.A.S.H.O. Designation: M 66.

SECTION 100 - TIMBER

Change entire specification to read:

100.1 Description. This specification covers structural timber and lumber used in the construction of bridges, culverts, and all other dimensional lumber and timber uses, except for forms and falsework.

100.2 Materials. All timber and lumber shall be of the species and grades called for on the plans or in the special provisions.

100.3 Grading Rules. Lumber and timber furnished under this specification shall comply with the following:

1. Structural timber shall be graded in accordance with the grading and dressing rules prescribed in A.S.T.M. Tentative Methods for "Establishing Structural Grades of Lumber," Designation: D245.

2. Commercial stress grades with grade descriptions providing material of stress value equal to or higher than called for by A.S.T.M. Designation: D245-49T are acceptable under this specification.

100.4 Inspection Certificates. Inspection certificates shall be furnished without extra charge with each shipment of timber or lumber. These inspection certificates shall be issued by one of the following lumber inspection bureaus:

West Coast Bureau of Lumber Grades and Inspection
Pacific Lumber Inspection Bureau
Port Orford Cedar Association
California Redwood Association, or
Western Pine Association.

All lumber and timber, regardless of grade marking, may be inspected by the Engineer for grade and quality at the point of origin, treating plant, or final destination, as he elects.

100.5 Size and Surface Requirements. All lumber and timber shall be rough or dressed as shown on the plans or as otherwise specified. Rough lumber shall be full size as specified. The finished dimension for dressed lumber shall conform to those of the "American Lumber Standards" as adopted by the U.S. Department of Commerce and shown in their pamphlet "R16-29, Lumber."

SECTION 102 - TIMBER PRESERVATIVE

102.1 Material Covered. Change to read:

This specification covers the quality of creosote oils, creosote coal tar solution, creosote petroleum solution, Wolman Salts, (Tanalith) and Ammoniacal Copper Arsenite (Chemonite) for use as timber preservative.

102.2 Preservatives. Add the following new provision:

Wolman Salts (Tanalith) shall be acid free and shall have a composition by weight within the following limits:

Sodium Fluoride (NaF)	22 to 25 percent
Disodium Hydrogen Arsenate (Na_2HAsO_4)	22 to 25 percent
Dinitrophenol	5 to 12-1/2 percent
Sodium Chromate (Na_2CrO_4)	34 to 37-1/2 percent

The preservatives shall have at least ninety-five (95) percent of these materials calculated on a moisture free basis.

The pH of the treating solution shall be not less than 7.2 or more than 7.8.

In the computation of the weight of Wolman Salts that have been retained in the wood as the result of pressure treatment, nothing other than the pure hydras compounds listed above shall be considered.

Ammoniacal Copper Arsenite (Chemonite) Solution shall be made in accordance with the following specifications:

The solution shall have a total concentration of active toxic ingredients, $Cu(OH)_2$ and AS_2O_3, of not less than three (3) per cent. This percentage shall be made up of water insoluble salts formed by the interreaction of:

Copper Hydroxide	$Cu(OH)_2$	1.8%±	0.2%
Arsenic Trioxide	AS_2O_3	1.3%±	0.2%

in the presence of the following:

Ammonia	NH_3	2.8%
Acetic Acid	CH_3COOH	0.05%

The remainder of the solution shall be water.

The total concentration of salts in the treating solutions may be varied provided the specified net retentions of dry salt in the wood are obtained.

The impurities in the treating solution shall not be of such character or quantity as to interfere with the deposition of the preservative in the wood.

The net retention of the preservative shall be calculated as pounds of Cu O plus As_2O_3 deposited in the wood in the proportion of 1.5 parts of the former 1.3 parts of the latter. An excess of either ingredient above this proportion shall not be counted in the net retention.

SECTION 104 - GUARD RAIL MATERIALS

Change entire specification to read:

104.1 Material Covered. This specfication covers the materials for use in the construction of guard rail.

104.2 General Requirements. Before any type rail is used, the manufacturer's plans and specifications shall be submitted and approved by the engineer, and the rail shall be constructed in accordance with such plans, except as herein provided. Plans shall show full details of all assemblies.

Sampling and testing shall be done in accordance with standard recognized practice for the units described herein or to the specifc method as indicated.

Upon request the contractor shall furnish the engineer with specimens of rail and fittings for testing purposes free of charge.

Two certified copies of mill test reports showing the chemical and physical characteristics from each heat from which metal is used shall be furnished by the contractor.

104.3 Beam Type Rail. The rail element shall be made from steel plates which shall conform to the specifications of the SAE for carbon steel of the 1000 series which specify a maximum carbon content of 0.85% or to Grade C of the current "Specifications for Carbon Steel Bars for Springs," A.S.T.M. designation: A 14. In addition a two (2) inch test specimen of the steel shall elongate not less than twelve (12) percent.

The plate shall be formed into a beam by shaping the plate to the arc of a circle or by corrugating the plate longitudinally. The finished beam shall be not less than twelve (12) inches wide and shall be of a length equal to the post spacing plus additional length for lapping at joints. The minimum thickness of metal in the plate shall be as specified herein dependent on the shape of the beam.

> For beams shaped to the arc of a circle with a horizontal depth of at least one (1) inch and less than three (3) inches. A minimum thickness of metal shall be No. 9 gage (6.25 pounds per square foot.)
>
> When the plate is corrugated longitudinally or shaped into any other form and the depth as a horizontal beam perpendicular to the line of the rail is three (3) inches or more, the minimum thickness of metal shall be No. 10 gage (5.625 pounds per square foot).

The rail element shall be spliced at each post by lapping in the direction of traffic. The holes in the plate nearer the post shall be slotted to facilitate erection and to permit expansion. The rail element including splices shall have an ultimate tensile strength of at least 70,000 pounds.

On curves of one hundred fifty (150) foot radius or less, the rail plates shall be shop curved as required. The radii of curvature shall be in increments of ten (10) feet from a radius of one hundred fifty (150) to fifty (50) feet inclusive and in increments of five (5) feet from a radius of fifty (50) feet to and including twenty (20) feet.

Where the rail is on a curve the plates at the splice shall make contact throughout the area of the splice, forming the beams before erection if necessary.

The edges of the beam shall be rolled or rounded so that they present no sharp edges. The projecting heads of all connection and splice bolts shall be rounded and shallow so that no appreciable projection will obstruct a vehicle sliding along the rail.

The beams shall be either galvanized or painted in accordance with the requirements specified herein.

104.4 Offset Brackets. Offset brackets may or may not be required depending upon the design of the beam element.

No offset brackets will be required for beams having a depth of three (3) inches or more providing the edges of the plate make contact with the post. If the edges of the plate do not make contact with the post, they shall be horizontally supported by a metal offset bracket which may or may not be resilient.

Beams with a depth of less than three (3) inches shall be offset from the posts with a bracket which will support the rail element five (5) to seven (7) inches from the face of the post. The bracket shall be of a spring type and shall provide support for the beam to resist horizontal forces normal to the face of the beam. The offset spring bracket shall deflect one (1) inch under a compression perpendicular to the line of the rail of not less than three thousand five hundred (3,500) pounds and not more than six thousand (6,000) pounds. It shall not upon release of the first application of this load held for one (1) minute show a permanent deformation greater than three-eighths (3/8) inch and upon each succeeding application of the same load held for one (1) minute it shall not show a permanent deflection greater than five (5) percent of the deflection. The permanent set or deformation shall be measured between the point or points of attachment of the bracket and the rail and the base of the bracket. The bracket shall not collapse under a compression load of ten thousand (10,000) pounds. The spring bracket and connection to the post combined shall be capable of supporting a load of two thousand three hundred (2,300) pounds at the rail parallel to the rail.

Non-resilient offset brackets shall be made from cast iron or malleable cast iron and shall be of a design, dimension and weight specified or as approved by the engineer.

The brackets shall be either galvanized or painted in accordance with the requirements specified herein.

104.5 End Details. A short portion of the rail known as the end plate shall project beyond the outside edge of each end post. This plate shall be of the same gage as the rail, shall be securely fastened to the post and rail and shall be bent back from the front line of the rail upon an approximate radius indicated on the plans. Where end posts are adjacent to bridge end posts or railings, it may be directed that the end plate be omitted.

104.6 Fittings. The fittings shall be of the dimensions and material shown on the plans. All metal fittings including bolts, nuts, and washers shall be galvanized.

The fittings shall be of sufficient strength to develop the full strength of the rail elements or as otherwise specified herein.

104.7 Shop Fabrication. All parts of the guard rail shall be fabricated and all holes drilled in the shop ready for immediate and complete installation. No punching, cutting, burning or welding will be permitted in the field. Holes for special details in exceptional cases may be made in the field when approved in writing by the engineer, but such holes shall be drilled.

104.8 Shop Finish. The materials shall be galvanized or painted as specified herein.

1. All metal other than steel sheets required by the plans or specifications to be galvanized shall be galvanized after fabrication to meet the current "Specifications for Zinc, (Hot-Galvanized) Coatings on Structural Steel Shapes, Plates and Bars and their Products", A.S.T.M. designation: A 123. The galvanizing on steel sheet shall conform with the requirements for Class C, zinc coating of the current "Specifications for Zinc-Coated (Galvanized) Iron or Steel Sheets", A.S.T.M. designation: A 93.

2. Shop painting. All metal not required to be galvanized shall, after fabrication, be cleaned to a steely brightness and painted in the shop with a coat of approved red lead primer or approved zinc chromate primer.

104.9 Posts. Wood posts shall conform to the requirements for guard rail posts as specified under Section 64.

Add the following new specification:

SECTION 107 - RIGHT OF WAY MARKERS

107.1 Description. This item shall consist of furnishing all materials and erecting timber posts for right of way markers conforming to these specifications and of the design shown on the plans at points indicated herein or ordered by the engineer.

107.2 Materials. Timber shall be 1200 # f conforming to the A.S.T.M. Specification D 245 - with revisions to date of contract. Timber shall be Douglas Fir (Coast Region), Port Orford Cedar, or Close-Grained Redwood.

Commercial stress grades of lumber with grade descriptions providing material of stress value equal to or higher than called for by A.S.T.M. Specification D 245 are acceptable under the contract.

Timber preservatives shall conform to the requirements of Section 102.

Paints and paint materials shall conform to the requirements of Section 106.

107.3 Construction Methods. Right of way markers shall be erected to define the right of way lines and, unless otherwise specified shall be set at beginning and end of each project, at beginning and end of each curve, at all corners of irregular right of way lines, and approximately one-half (1/2) mile apart on long tangents. Right of way markers shall be set plumb and the post hole shall be backfilled in layers with approved material thoroughly rammed with an iron tamping tool.

The lower twenty-eight (28) inches of the post shall be given a preservative treatment in accordance with Section 63. When wood is dry and clean, posts shall be given three (3) coats of paint and stenciled letters and trim shall be applied as specified in Section 66.

107.4 Measurement and Payment. The number of right of way markers in the completed and accepted work shall be paid for at the contract unit price each for "Right of Way Markers," which price shall be full compensation for furnishing, erecting, treating and painting the posts, for inspection certifications, and for all labor, materials, tools, supplies, equipment, and incidentals necessary to complete the work, including excavation and backfill.